THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., JULY 16, 1891.

THE WEEK IN IRON CIRCLES.

General Features. Despite the daily improving crop prospects, the general iron market may not, after all, immediately experience the good effects of the same to the degrees heretofore predicted. The trouble seems to be with the unsatisfactory financial condition of the railroads. Car companies state that they do not expect large business for this Fall, owing to the inability of many railroads to pay cash and the unwillingness of the car makers to accept paper. It is felt that within thirty days orders will be given out which will keep the car works running full, though at low prices, throughout the year, and that as soon as money can be realized for the crop that is being marketed, business at remunerative prices will ensue. It is believed that the demands for cars for transportation purposes will be greater than ever before, and that a car famine will be one of the results this Fall, which, owing to the delay on the part of the railroads in placing their orders, it will be impossible to supply. The general outlook is, therefore, for a fair amount of business through the Fall with an improvement in prices for next year. At Cincinnati the pig iron market is fairly active for this season of the year when only light transactions are looked for. Prices remain about the same, except that now and then sellers seem disposed to meet offers with prices a trifle shaded. It is fair to say, however, that this is the exception and not the rule, and that for standard brands prices are still maintained. Among the Southern charcoal furnaces, Warner has just resumed operations, and La Grange will probably have repairs completed within two weeks. It is reported that one of the Woodstock coke furnaces will start on the 15th inst, and Etowah is about ready to blow. Trussville has been deferred on account of the failure to perfect the lease. The Louisville market is confined to car load lots. There has, however, been heavy buying on the part of the large car companies, one closing for about 7,000 tons and another for about 3,000. The prices at which the iron was sold were extremely low, but it was thought wise on the part of furnaces, owing to heavy stocks, to make the sale rather than carry the iron. Coke prices are ruling steadily at basis of $10, Birmingham, for grey forge, with an advance of 25 to 50 cents asked for last year's delivery, and this basis held firm by some of the larger companies. The Chicago pig iron market has shown increasing dullness during the past week; orders now going, for the most part, are for small lots. A few large consumers are still holding off before placing their season's contracts, but the number is limited, and the parties waiting are doing so in hopes of getting concessions, either in the way of job lots or iron from furnaces having depleted order books. Prices remain on about the same basis as a week ago, though on Southern cokes there is a little more firmness on some grades, notably No. 1 soft, which at present is scarce for early shipment. The railroad buying, which was expected to start July 1st, has not yet begun, notwithstanding the fact that the time is rapidly approaching when the crops will have to be moved, and all available rolling stock will be in constant demand. Postponement of purchase on the part of railway lines simply means so much additional business when these companies come into the market, and a larger impetus will be given to trade whenever this movement starts up. While the Detroit market continues in the same unsatisfactory state as regards prices, there is a good volume of business being transacted. Especially is this true of Lake Superior charcoal. Notwithstanding the large majority of malleable iron makers made their purchases in June, still there were some who have but recently come into the market, and they, together with the car wheel makers who are covering for orders as fast as taken, have caused more inquiry for this class of iron. There are also some inquiries for round lots of Southern, but while nearly all furnaces are willing to accept low prices for present sales for prompt delivery, yet there are a few at least who will not make present low figures as basis for six to twelve months' delivery in the future. Shipments at Buffalo continue moderately heavy in the aggregate, but they are distributed over wide territory. Consumption is exceedingly light, and at present is probably less than production. There are many indications, however, of a large increase in consumption inside of the next month.

The Local Situation. In the absence of the correct figures, either as to the total amount of the ore sales thus far, or of the amount of ore shipped from the mines up to date, it is more than difficult to obtain anything like an intelligent statement of the situation, and all that appears in the way of figures must necessarily be more or less a matter of guess, the facts being as yet beyond the reach of the trade, except in so far as each dealer knows his own position, which is carefully concealed from all the others. Yet they all agree that the sales up to date cover nearly 90 per cent. of the intended output, and as it would be a physical impossibility to bring down more ore this year than this approximate amount, there is but very little chance of materially increasing the figure. Among the more recent sales were several of non-Bessemer hematites, for delivery within sixty miles of the sea-board, the total sales of this class of ore east of the mountains fully aggregating half a million tons. When it is considered that foreign ores are very cheap this year, in connection with low ocean freights, the great shrinkage in the price of Lake Superior ore, to enable it to compete with this foreign ore, can better be appreciated. Eight cents per unit is the average cost to the Eastern consumers, who in the present depressed state of the ore trade are enjoying a good thing. It must be considered, however, that while the sales in this market are made directly to the makers of pig iron, thus taking on the character of staple business transactions, the Eastern markets are sensibly influenced, and to a degree controlled, by the general financial situation as reflected by Wall street, so that they must necessarily assume something of a speculative character, which is altogether lacking here. The merry war as to lake freights received another impetus this week by the advance of the Escanaba and Marquette rate, which was stubbornly resisted by shippers for a time, but without avail. It is quite evident that with the incoming grain crops there will be a further demand for lake transportation, which in turn must tell upon the rate. The ore men, of course, have largely discounted this unavoidable contingency, but since they have already disposed of by far the largest portion of their output and can apply the increased rate only to the sales yet to be made, the chance is not excluded that they may have to pay a great deal more than they contemplated when the bulk of their sales was made. There are at this writing quite a good many craft that have not gone into commission this season, the low freights paid thus far enabling only the larger carriers to do business with any sort of economy. With the advent of better rates it is very likely that these smaller vessels will enter the market and add to the total tonnage under employment. The pig iron market is quiet and sluggish. There is very little buying in any sort of quantity, the heavier consumers having placed their orders some time ago. What little trading is going on, is confined to smaller lots, such as any furnace will sell in connection with their regular orders so as to get out the full capacity of the stack. The mills are busy in Pittsburgh, but the most of them in the valley are either shut down for repairs, or are preparing to do so.

THE PROGRESS OF METAL TIES.

Though there are over 25,000,000 miles of railroad in foreign countries using metal ties, being 13.21 per cent. of their total mileage, American railroad managers are as yet slow to adopt them, although several roads are trying them to a limited extent. It is stated on apparently good authority that more than 80,000,000 wooden ties are used in the United States each year, the same costing $40,000,000. Five hundred million cubic feet of lumber is used yearly for railroad purposes, requiring the annual culling of more than 1,000,000 acres of our best timber land.

The table below is copied from a report, just published, by the Forestry Division of the United States Census Bureau, and speaks for itself:

The following table gives the total area of timbered land located in the States of Michigan, Wisconsin and Minnesota. The principal varieties of timber, together with the total product, and total value of each variety, is given:

Principal Varieties of Timber.	Area in Acres.	Estimated total product of merchantable timber. (Feet, board measure.)	Total value.
White pine	8,343,695	47,304,557,519	$191,530,084
White and Norway pine	1,309,420	3,649,233,000	10,332,929
Hemlock	345,144	1,627,208,000	1,658,030
Cedar	106,467	527,080,500	742,510
Miscellaneous soft woods	1,021,261	3,341,248,000	3,991,466
Oak	57,921	301,231,000	942,177
Beech, birch and maple	91,539	552,402,900	989,309
Ash	1,238	10,395,000	33,020
Elm	37,246	82,018,000	126,465
Miscellaneous hard woods	1,156,460	6,057,826,800	7,279,280
Total	12,469,391	63,450,200,719	$210,625,213

The consumption in Michigan, Wisconsin and Minnesota of merchantable standing timber of all varieties by the manufacturing industries operating mills, whose reports are presented herewith, is shown in table 12 to have aggregated 9,845,113,654 feet (scaled measure) during the census year, to which should be added the timber cut and manfactured by establishments having mills located in other States. From reports embracing the operations at such places, it appears that about 750,000,000 feet is manufactured at points on the Mississippi river, and 750,000,000 feet at points on Lake Erie. These quantities, added to the domestic consumption, aggregate 10,670,000,000 feet of standing timber consumed annually for raw material. It also appears from the reports of the mill establishments referred to that the quantity of standing timber now owned by them is only sufficient at this rate of consumption to supply their requirements for four or five years.

While oak, above mentioned, includes 60 per cent. of the ties used, the entire oak product of the three States would furnish less than one-tenth of the ties used this year. Make all the hemlock, cedar, elm and oak into ties, now growing in the above-named States, it would still be less than half of this year's consumption.

It is no wonder that the friends of American forestry are becoming alarmed at the rapid depletion of our timber supplies, and that the substitution of other materials for wood is going rapidly forward. If it be true, as stated, that 3,000,000 tons of steel would be required annually to replace with steel ties the wooden ones removed each year, the field for building up a great industry would appear to be most inviting—but a great deal of pioneer work must be done yet.

COTTON-TIE MANUFACTURE AT HOME AND ABROAD.

Though not claiming as much public attention as tinplate manufacture, the extension of the cotton-tie industry in the United States is going steadily forward, thanks to the favoring provisions of the McKinley Act. Under that act a specific duty of one and one-tenth cents per pound is imposed on all band iron, and an additional two-tenths of a cent per pound on band iron wholly manufactured into ties, as against an ad valorem rate of 35 per cent. under the old law. Thus, one ton of such ties valued in England at an average of £7, or $34.06, being dutiable at the rate of 35 per cent., would pay a duty of $11.92, while under the new law at the specific rate of one and three-tenths cents per pound the same ton would have to pay a duty of $29.12, or an increase of $17.20 per ton.

That this duty is practically prohibitive now appears from a recent report to our State Department, by United States Consul Burgess, of Tunstall, England, within whose consular district is located the Wheelock Iron and Salt Company (Limited), commonly known as the Wheelock Forge, the only one in England that has devoted its entire energy to the manufacture of the one article—the widely known "Wheelock ties." This entire plant was built, and the machinery made, especially for this one particular branch of the iron industry. It was therefore impossible, without very great additional outlay of capital, to so alter and rearrange the plant as to make it of use for any other line of manufacture. Thus when the late legislation was accomplished, which proved so adverse to the cotton-tie interests of Great Britain, this plant was at once so deeply affected as to cause an entire suspension of operations. The magnitude of the business done by this particular forge, and its importance in the cotton-tie industry of Great Britain, will at once be recognized in the fact that, out of an average annual exportation of 25,000 tons, 15,000 tons were produced at the village of Wheelock. The ties are cut in lengths of 11 feet each, out of No. 18 iron gauge, one inch wide. Thirty of these ties constitute a bundle, 44 of which bundles weigh just one ton.

Referring to a recent interview with the managing director of the works, Mr. Burgess says:

With a plant valued at $250,000 on their hands, utterly unfit for the manufacture of any other commodity, the blow has fallen very heavily upon the share-holders. There was some talk at first of investing the additional capital required and of rearranging the plant for the manufacture of some other line of iron product. This idea, however, has been abandoned, and the directors have decided to wait and see whether the next Congress, or at least the next administration, will not so modify the tariff laws as to permit of them resuming their operation as heretofore. The cessation of operation has, as a matter of course, grievously affected the little village of Wheelock; nearly the entire village was dependent, either directly or indirectly, on this one industry. Englishmen are not like men of some other nations; they do not like to change either their abode or their particular line of work, and when it becomes a matter of necessity, as in this case, they are slow to make the change.

The weekly consumption of coal at this forge was from 600 to 700 tons of a peculiar quality mined in the neighborhood, yet almost entirely unfit for any other line of local manufacture or consumption. The question, "What shall we do with this large part of our product?" has become one of serious importance to the colliery proprietor. Being of a cheap grade and only fit for a certain line of manufacture, the question of freights has practically almost killed its sale.

The picture is certainly not an attractive one, nor can American manufacturers contemplate it without sympathy for the employes thus thrown out of work; but their first duty is to build up the prosperity of the United States, and if the transfer of a great industry from the Old World to the New works temporary embarrassment on the other side, compensation is found in the fact that many thousands of people in our own country will be benefited and made prosperous and happy. As to the stockholders of the English works, they have been pocketing American money so many years that they can just as well turn their energies in another direction, albeit they do not like to change their abode or line of work.

HEMISPHERIC FORGES, AND SUCH.

We guess we quite agree with our graphic contemporary of the graceful pen, the *Age of Steel*, in the statement that "the austral sections of the nation are coming into active industrial participitation with the rest, and as Lazarus came out of his tomb, so is the South shaking the napkin from the face of the dead and coming into vital unison with the rest of the national family," and we will try real hard to coincide with it in a poetic proposition that "the Southern giant with its feet in the Gulf, is in industrial partnership with the Vulcan of the Alleghanies and the Cyclops of the Northern lakes." But we submit, in all candor, whether it isn't stretching the cyclopean legs of our modern Vulcan a little, when it predicts that the iron centers of the United States will some day "be grouped in the Pittsburgh region of the North; in Birmingham, East Tennessee and North Carolina in the South, and at Puget Sound on the Pacific coast." This is a gigantic geographical triangle, but we presume it has to be in order to contain, as our St. Louis friend so beautifully puts it, the "hemispheric forges of the future." By the way, Manager Swank, of the American Iron and Steel Association, what are "hemispheric forges?" We fail to find them classified in this year's Iron and Steel Directory.

ROBINSON CRUSOE, on his solitary island, was a whole community of congenial souls compared with solitary position occupied by the *Un-American Artisan* among trade papers, on the subject of the American tinplate industry. It is conspicuously and unspeakably lonesome. Not a single trade journal, even in its own special line, is with it in its absurd and untenable position.

EVERY iron manufacturer will read will keen relish the article of Mr. Jacob Reese, the well-known metallurgist, in another column. Mr. Reese has an inexhaustible fund of interesting incidents of his experience in the iron industry, and his contributions are always perused with pleasure and profit.

MARKED improvement is shown by the *American Manufacturer* in its new typographic dress and more convenient form. Our congratulations are hearty and sincere.

BLUE BLAZES.

BY JACOB REESE.

In 1833 my father introduced the boiling process in the works of the Valentines, at Bellefont, Pa. The fire brick required was ordered from Scotland, but they never came, as the ship was lost in a storm, and the brick went down to the bottom of the sea. As it required about nine months for the order to go over and the brick to come back, father concluded to build his furnace of stone. The roof was built of sandstone, and the sides of limestone, and the working chamber was lined and fitted with forge cinders.

I remember very well the day when the works were ready to start. Mr. Valentine had invited people from Philadelphia and all the surrounding country to witness the new departure in the manufacture of iron, and they came on horseback, in carriages and in the stage coach. I thought that I had never seen such a large number of "big bugs" in my life before.

When the heat was ready father said, "Pull up the door, Jacob." I pulled up the door and father pulled out a big, hot ball of iron and slung it under the hammer; and amid the smiling glances of more than two hundred men and women, said, "Pull the gate, Isaac." Up the gate went, and down came the big hammer and smashed the big ball of hot iron into ten thousand pieces, scattering it among the crowd of ladies and gentlemen, whose smiling glances were instantly changed to expressions of fear and disgust; and although Isaac shut the gate at once, the mighty water-wheel still turned and lifted the hammer, and down it came every two seconds, until father "gaged it up." Then father said, "Sweep it off, Isaac," and "Pull up the door, Jacob," and I cried, "O, father, cook it more, cook it more!" for I thought that he had not cooked the iron enough. But father coolly said, "Don't cry my son, I will cook it with Blue Blazes." And up went the door and out came another ball of iron, which he left on the standing, and taking the ladle he poured about a quart of water on the ball, when lo! a big Blue Blaze arose from it, ascending five or six feet high. Father then swung the ball under the hammer, and Isaac pulled the gate, the big wheel turned and the hammer came down and beat on the iron; but it did not knock it into dust as it did the first. The hammer knocked the cinder out of it, and it was hammered into a bloom. And thus all the remaining balls were treated with Blue Blazes and all worked well.

After another heat was charged and father was resting, I asked him how it was that pouring water on the iron made it work better. He replied, "You know, my son, that our fire-brick were sunk in the bottom of the sea, and I had to build the sides of my furnace with limestone, and the limestone dried the iron. Now, when the iron is too dry, Blue Blazes is the only thing that will make it work good." I then asked father "What is Blue Blazes?" He replied, "I don't know what it is, but I know when the iron is dry and won't stick together under the hammer, that Blue Blazes will cure it and make it work like lead."

I asked everybody I met, "Do you know what Blue Blazes is?" but the Winter passed and the Summer came, and nobody could tell me what Blue Blazes was. But one afternoon, while I was fishing for speckled trout, with a fly, on Spring Creek, Judge Burnside came along with a beautiful young lady on his arm; and as he neared me he said, "Let me fly one or two for you, my son;" and holding the rod away from him, I replied, "If you will tell me what is Blue Blazes, I will. Don't you remember, when father put the first ball under the hammer, that it was knocked into flinders, but when he made the Blue Blazes come out of the others they hammered like lead?" "O, yes," said the Judge, "You are the son of Mr. Reese. Blue Blazes—Blue Blazes—well, that relates to chemistry, and I don't know anything about it; but I am going down to Philadelphia next week, and I will bring you a work on chemistry which will tell you all about Blue Blazes. I handed the rod to the Judge; and while he was fishing I was looking at the beautiful blue eyes of the young lady, and I wondered if that book the Judge was going to bring me would tell me why I felt better while I was looking at them. The Judge gave me my rod, and taking the blue-eyed girl on his arm, he left me; but true to his promise, in a few weeks he brought me the Oxford Edition of Chemistry, which I found to be a big book full of hard words such as SiO_2—Fe_2O_3—CO—CO_2 and such like, but I could not find out anything about Blue Blazes in it.

After studying the book for ten years I found out what Blue Blazes was: that by pouring water on hot iron, the water is decomposed, the oxygen uniting with the iron making a new cinder, which makes the iron stick and weld; while the hydrogen is evolved as Blue Blazes; but I have never yet found a book that properly explains why the glance of a blue-eyed girl would make me feel so good.

And now, after making several hundred thousand dollars in chemistry and metallurgy, I look back with great delight to the day when my father excited my interest in Blue Blazes, and the meeting of Judge Burnside and the blue eyed girl on Spring Creek, and see how little things tend to turn a man's energies into channels of usefulness and profitable life.

PHILADELPHIA, July 8th, 1891.

RECIPROCITY EXTENDING.

The most far-seeing clause of the McKinley tariff bill is the one that provides for reciprocity. It was the work of a man of genius, a statesman of the front rank. Reciprocity is a wonderful thing, if we only consider its scope. It compels the countries of South and Central America, as well as the West Indies, to either submit to a tariff upon their exports to the United States, and thereby be driven from our markets, or else to accept a free market for their product and give to the manufactures and other things, raised in this country, a free market, or at least privileges equal to that which they obtain from us. In other words, if the countries of the West Indies, South and Central America desire to trade with us, they must do so upon terms dictated at Washington. Now, the trade of the United States with its neighbors to the South is enormous, profitable alike to the Southern countries and to Europe, in this wise: We purchase about five times as much from the countries on this hemisphere as they purchase from us—their market here is greater many times over than ours is with them. It is essential to their prosperity that they continue to supply us with their sugar, their coffee, rubber, dye-woods, hides, etc. The purchases made by South and Central Americans in exchange for their products sent here and abroad, are to a great extent made in Europe. The money that they obtain from us for their goods they spend—in large part—in buying manufactures which they need, from Europeans. Reciprocity now steps in and says to these people: We are willing to continue to receive your goods, but you must provide a market for ours. There must be a fair exchange. And here is how our Government compels the other countries to accede to this policy of reciprocity. The sugar and coffee and rubber of Brazil, it is well known, is now admitted here free. Brazil agrees to reduce her tariff upon American goods so that Americans have a fair chance of supplying their markets with goods which they formerly purchased in Europe. Now, it was necessary to Cuba that she should continue to send four-fifths of her sugar here—necessary both to Cuba and to Spain. But it was impossible, without giving American goods a chance in Cuban markets, for Cuba to sell us her sugar. Therefore Spain was obliged to make special and valuable concessions to Americans in the markets of Cuba, although directly antagonistic to the trade of her own people. So it is with all the other countries of South and Central America and the West Indies, that are in competition with each other in our markets—they must all reach us upon terms of equality, hence they must all succumb to reciprocity, and therein lies the opportunity.

Right there lies the opportunity of American shipping. Its rehabilitation is possible under these conditions. So it is, that the probability of our opening up a larger trade with Cuba, with Venezuela, Brazil, Argentine Republic, Uraguay, and probably Chili, and other West coast countries, all of whom are gazing longingly, or have swallowed the tempting bait which has been dangling before their eyes since the passage of the McKinley tariff bill, is great.

But the Postmaster-General has a grand opportunity of helping forward this matter, by encouraging the establishment of steamship lines, and we wonder why he don't make a move?—[Seaboard.

THE MANUFACTURE OF IRON AND STEEL IN AUSTRALIA.

We have been favored with particulars as to the syndicate which is being privately formed for the development of the iron trade generally in New South Wales. Mr. Mitchell has made great efforts to bring about the establishment and development of the industry of ironmaking in Australia, and the syndicate is one result of this. Among the leading men who are interesting themselves in the matter are Messrs. John & J. C. Cunninghame, the well known Scotch ironmasters, and Mr. R. C. Want, Westminster; in fact, they are named as the provisional directors of the proposed syndicate. The object for which the syndicate is mainly being formed is to further investigate and verify the reports which have already been made by experts as to the quantity and quality of the iron ore deposits. So far the extent is proved to be very large, and the analyses are quite satisfactory; but the syndicate, profiting by the experience that has been gained in connection with the opening out of Spanish mines, will, by boring, obtain exact information as to the thickness also of the deposits, after which a company will be formed for the purpose of opening the mines, and erecting furnaces and mills of the most modern and approved type for the manufacture of iron and steel for the supply of the colonies of Australasia and other available markets. The government of New South Wales is reported to regard the project with much favor. Our readers will remember that, as an inducement to bring about the establishment of steelworks in the colony, the government advertised that they would give out an an order for 175,000 tons of steel rails, but these were to be made from material to be entirely manufactured and finished in the colony out of iron ore raised there, and other necessary minerals the natural product of, and with coal, coke, or other fuel smelted, gotten, and raised within the colony. We learn that the government of New South Wales has entered into negotiations with Mr. Mitchell for the manufacture and supply, as an initial order, of this 175,000 tons, to be delivered at the site of manufacture over a period of five years, from January 1, 1893, at a price equal to the ruling price for the time being of British-made rails landed at Sydney. The New South Wales Railway Commissioners have arranged to give special terms for carriage of raw materials to and manufactured goods from any works that may be established. It is calculated by Mr. J W. Ormiston, Glasgow, who has personally inspected the properties first to be developed, that hematite iron suitable for conversion into steel can be manufactured at 40s. per ton, and the cost of steel rails would be £4 10s. per ton. Now, the average cost of imported steel rails delivered at Sydney over the past twelve years has been £6 9s. 4d., so that there would appear to be a large saving brought about by manufacturing in the colony. Mr. Ormiston says that at one place—Rylstone—he had never before seen such a close grouping together of all the minerals essential in the iron manufacture. A circle of a radius of two miles would enclose lime, coal, iron ore, and limestone, seemingly in great abundance, all ready to hand. A sample of the ore analyzed by Mr. Lewis Colquhoun, Ardeer Ironworks, Stevenston, Ayrshire, gives 55 77 per cent. of metallic iron and 0.043 per cent. of phosphorus, while Messrs. Pattinson & Stead, Middlesbrough, found 56 7 per cent. of iron, 0.048 per cent. of phosphorus, and 5.02 per cent. of silica in a sample from Picton, and rails made from it would contain about 0.1 per cent. of phosphorus. But they say that even less phosphorus would probably be found away from the outcrop. We understand that Messrs. John Stevenson & Cowper, Middlesbrough, have charge of the formation of this syndicate, and it is not improbable that Mr. Stevenson, who has had great experience in similar matters in this country, will be required to go out to New South Wales in order to organize and set in operation the contemplated works.—[Iron and Coal Trades Review (London).

THE MANUFACTURE OF IRON ON THE PACIFIC COAST.

The articles published in our iron ore department this week on the discovery of a Bessemer ore in Southern California brings up the whole subject of the manufacture of iron and steel on the Pacific coast. At present the production of iron and steel west of the Rockies is confined to the output of a single charcoal blast furnace at Oswego, near Portland, Ore., producing about 40 tons a day and to the four rolling mills in and near San Francisco, Cal., producing not to exceed 50,000 tons of iron and steel a year. There is a blast furnace at Irondale in Washington, on Puget Sound, but it has been idle now for 18 months, while the California charcoal furnace that last made iron in 1886 has been abandoned. A furnace is under construction at Kirtland, Wash., near Seattle, the stock bins and the auxiliary buildings of which were up and the excavations for the foundations of which were nearly finished in May of this year.

The difficulty in the way of the development of the iron and steel industry of the Pacific coast, at least up to the point of supplying its own demand, has been fuel. California has no mineral fuel that can be used at all in the manufacture of pig iron and such deposits of iron ore of a good grade as it possesses are at present so located with reference to fuel that can be brought in from abroad or from other states as to put out of the question at present the manufacture of pig iron from native ore with anything but charcoal, and it is probable that the cost of charcoal iron laid down at San Francisco, which is the chief point of consumption, would be much above the price at which good foreign pig iron could be bought.

The mills of San Francisco depend almost entirely upon anthracite coal. This costs the mills from $7 to $8 a ton laid down at the works, and though Washington coal can be laid down at a lower figure, it is regarded as more economical to buy the anthracite coal.

With coal at these figures and pig at $26 a ton it will be seen that the iron and steel works of California are heavily handicapped from the start, and yet there are mills at San Francisco which, in spite of all the drawbacks, have a record of which to boast.

But it is not in California but in Washington that the "Future Situs" of the iron and steel industry of the Pacific coast is to be located. Oregon, on the seaboard has some coal, but it is on Puget Sound in Washington that the best coal in greatest abundance is to be found.

The coal all through this section is cretaceous, a much younger formation than the carboniferous of Pennsylvania. It was all originally ligniti and even now most of the deposits are of this grade. In some places, however, notably near Wilkeson, the action of the heavy covering is freeing the Pennsylvania and other Eastern coals of the excessive water and volatile matter, and making them true bituminous coals, has been supplied by the heat of the pressure and fredings, and the ligniti has changed to a good bituminous and coking coal. A very good coke is made from this Wilkeson and similar seams, while there is an abundance of coal, not coking, that can be used readily in heating and especially in iron and steel manufacture where producer gas can be used.

In the neighborhood of this coal good iron ores are found. The magnetic ores of the Cascade range are somewhat similar to those of Cranberry, N. C., and there is no doubt but that iron ore of a good quality and in large quantities exists not far from the coals near Seattle. Magnetite from Mt. Logan shows (average of five analyses) 69 26 iron, 1.96 silica, .03 phosphorus. The iron and steel works now in course of erection at Kirkland will use ores of this grade.

It is on the Puget sound that the iron and steel industry of the Pacific coast must be located. Far-seeing business men are realizing this. The Kirkland Iron & Steel Works, the wire nail mill that is in course of construction, the iron ship yard that is being built, are all evidences of this. And Puget Sound is not only to make iron and steel for the Pacific coast, but for much of that horde of people who get their supplies over the Pacific ocean. Costs at present are excessive, but these will be reduced. Coke cannot always be sold at $7 to $12 50 a ton, but when the abnormal labor and speculative conditions that now exist become normal then Puget Sound will take its rightful position as a great iron and steel producer.—[American Manufacturer.

FOUR AND A QUARTER MILLIONS FOR BIG STEEL GUNS.

A Washington dispatch, July 13th, says: Proposals were to-day received for the construction of 25 8 inch, 50 10-inch and 25 12-inch breech-loading rifled built-up steel guns. Congress appropriated $4,225,000 for building these monsters. The proposals received to-day were from the Midvale Steel Co., the South Boston Iron Works and the Bethlehem Steel Co.

Midvale Steel Co—One 8-inch type gun with ammunition for testing, $22,028, to be delivered in 3 years; 25 service guns of the same pattern at the same price each, to be delivered in 8 years after the acceptance of type gun; 1 10-inch type gun $51,880, and 49 service guns at same price each, to be delivered in 8 years; 1 12-inch type gun, with ammunition, $88,592, and 24 service guns at the same price each, to be delivered in 8 years.

South Boston Iron Works—One 8-inch gun, $27,300; 350 rounds ammunition, $24,332; 24 service guns, $20,695 each, deliveries to begin in 1894, and to be made at the rate of 6 per year; 1 10-inch type gun, $60,560; ammunition for the same, $43,350; 49 service guns, $47,700 each, to be delivered 5 each year after 1895; 12 inch type gun, $100,000; ammunition for same, $60,000; 25 service guns, with ten rounds of ammunition, $79 500 each, to be delivered 5 each year after 1896.

Bethlehem Steel Co.—8-inch type gun, $43,893, delivered in 1460 days, and $42,035 if delivered in 2190 days; 24 service guns of same kind, at $19,723 each, delivered in 552 days, or $17,246 delivered in 730 days; 10-inch type gun, $78,937, delivered in 699 days, or $73,755 delivered in 882 days; 49 service guns of this size at $40,929 each, delivered in 2130 days, or $37,754 delivered in 3404 days; 12-inch type gun, $113,951, delivered in 791 days, or $106,558 delivered in 1090 days; 24 service guns this size at $61,846 each, delivered in 2038 days, or $54,473 delivered in 3134 days.

The Bethlehem bid was accompanied by some conditions, one looking to a change in the proportions of the hoops of the guns and another to allowances for advanced deliveries. Their bid was very complex, and it will require several days' time and much close calculation to ascertain which are the best terms that can be made by the Government. The act of Congress gives authority to divide the awards, but at their longest periods of time the Bethlehem bids are still the lowest in each class, and their lowest total of $3,785,850 for the 100 guns is the only one within the limit of the appropriation. The total of the Midvale bid is $5,359,500, and of the South Boston bid $5,174,312. The Midvale Company is located at Nicetown, Pa,

A New Rotary Expansive Steam Engine.

Mr. A. F. G. Brown, of Ayrshire, has invented a new rotary engine, of which a description is given by the London *Electrical Engineer*. The engine consists of a cylinder of peculiar shape, grounded to gauge, in which the piston revolves keyed to a central axle. The valves are arranged to cut off at the desired point and automatically close when exhaustion takes place. The engine has been made by Messrs. John Lang & Sons, of Johnstone, and tested by Prof. Jamieson, who has reported that on a series of trials of up to five consecutive hours the engine gave 29 i. h. p., and a mean of 20.78 brake h. p. at 574.5 revolutions, and an initial steam pressure in the cylinder of 80 pounds. The economy of steam, says the Glasgow *Herald*, is greater than any recorded results of any rotary steam engine, and quite equal to the very best performances of Willan's famous engines of the simple single cylinder, non-condensing type, for the gross weight of feed water used per indicated horse-power hour was only 27.2 pounds. This consumption would have been still less had it not been for the type of boiler used, the right angle bends in the steam pipes, and the neglect to have these pipes properly lagged and the cylinder jacketed, for 30 per cent. of the weight of steam used passed into the cylinder as water held in suspension, and from initial condensation. This is the first time, as far as we are able to learn, continues the *Herald*, that indicator diagrams have been taken from a rotary engine. Here, again, the improvements recently made by Mr. M'Innes, of Glasgow, on indicators, allowed them to be obtained with a beautiful even expansion curve, and they enabled Prof. Jamieson to point out to the inventor wherein still further adaptations could be made for the benefit of the engine. The brake used at these tests was of the latest rope type, with Salter's spring balances for indicating the forward and backward stresses. It required neither oil nor black lead throughout the five hours' run at full load, although bearing upon an especially large fly-wheel.

British Firms Must Wake Up.

A most serious ground of complaint against English and Scotch firms in the metal and hardware trades is their slow delivery of goods. Strange to say the loss of orders and their frequent cancellation after they have been given seem to have been a useless warning. On the other hand Canadian and United States firms are usually prompt in filling all orders. Jobbers, manufacturers and contractors, who have work to complete at stated times will not allow the same firm to cause a disappointment of this sort a second time. In fact they distrust the entire British trade and would rather place orders with local or United States firms at higher prices than risk the delays which have frequently occurred in the past few years in the shipment of British goods. Only the other day ten cars of wire goods were thrown back upon the hands of the shipper and the order given to a Canadian firm instead. These goods were promised in May and did not arrive until six weeks after they were due. British shippers lose more than at first appears. Until a couple of years ago a Canadian firm purchased all the structural iron of a particular kind in England. The English firm disappointed them at a most important juncture. They tried the States and had their order promptly filled. Since then all their orders have gone to the States.—[Hardware (Toronto).

Railway Speed in England.

After all that has been said of the achievements of the British railways in the matter of speed, there is a little sense of refreshment in this item, which London *Engineering* quotes from a London paper: "Some illustrations of modern railway speed cited before the Parliamentary Committee on the Cross County Railway bill merit especial attention, showing what can be accomplished when a railway company makes an effort. A Buxton coal merchant says that sometimes the Midland Co. manages to convey coal from Buxton to Chesterfield in 11 to 34 days, and as the towns are more than 20 miles apart it will be seen that sometimes the coal trains dash along the line at the rate of two miles a day. Once the witness found a bird's nest in a truck which had been 30 days on the way, and he reasonably believes that the nest was built and the eggs laid during the month. Yet this Buxton merchant is not happy and desires a change."

MR. L. M. MOYES, formerly agent of the Babcock & Wilcox Co., at 32 North Fifth St., Philadelphia, has surrendered the charge of the office and business at that point to the new agents, Messrs. W. C. Temple and Henry F. DePuy. In making this announcement the company say: "We request that any business which you may have to transact with our Philadelphia office be done through either of these gentlemen, who will always be ready to attend to it at that place."

To Chautauqua Lake Free of Charge.

Each Nickel Plate excursionist to Niagara Falls, Saturday night, July 18th, may visit Chautauqua, free. Limit, 5 days. Stop at Chautauqua or points west without extra cost.

LAKE SUPERIOR MINING NOTES.

The Ludington mine now employs about 600 men, this being an increase of 250 men over the force of last season.—[Iron Range.

The average amount of ore hoisted from the Chapin each day amounts to about 1,800 tons. At present there are no rail shipments to points south, all of the ore going to Escanaba, which port receives about 2,500 tons daily from this mine.—[Iron Range.

Drifting to No 2 shaft of the Hamilton mine is progressing very satisfactorily and the end of the drift is probably 250 feet from the shaft at the present time. The men who work at the bottom of No. 2 say they can hear each blast made by the men in drifting.—[Iron Range.

At what is known as the "old mine" at the Ludington, the miners are again breaking ore to the extent of about 70 tons per day. A diamond drill has been put in operation at this point and that end of the Lumbermen's Mining Co.'s property will be thoroughly explored. The shaft is down 300 feet and crosscutting the formation is now in progress.—[Iron Range.

It is expected that the work on the Schlesinger road will be completed about September 1st, when it will be used by the C. & N. W. for the transportation of ore to Escanaba. Over the old road only about 26 cars of ore are taken in a train owing to the heavy grades and this will then be used for the return of the empty cars from Escanaba. The grades on the new roads are much easier and it is expected that 35 cars can be taken in each train.—[Iron Range.

Development work at the Buffalo mine is keeping pace with production. The small deposit west of No. 2 Buffalo shaft has been opened up and its yield and character have exceeded anticipations. The mine is being opened out, both in depth and longitudinally, and we were informed by Supt. Cole that the openings are now three years ahead of the actual mining operations, which are still in the old workings, taking out the pillars so needlessly left by former operators.—[Lake Superior Democrat.

The Elba shaft reached the second level this week and only a few feet more of sinking remains to provide a sump for the water. A consultation of the directors or principal stockholders will be held early next week to determine whether the second level will be developed by drilling or drifting. The shaft is now bottomed in clean hard ore, very heavy. About 25 feet below the first level it passed through several feet of merchandise ore.—[Lake Superior Democrat.

Ore has been struck at the East Jackson. On the edge it was found quite mixed, but the shell was soon penetrated and now the drift is in 15 feet in nice soft ore that will yield high in iron. Just what its thickness is is not yet known, but the drift seems to be coursing diagonally through the vein, "cutting it bias" so to speak.—[Lake Superior Democrat.

Last week the work of sinking the U. S. Grant shaft another lift was commenced. The drift was carried south 140 feet 6 inches, and Capt. Broad says it certainly cut through the vein, but found it considerably mixed, the ore and jasper being in narrow bands or layers, separate from each other, but each only a few inches thick. In his opinion the vein will clear itself of the jasper as it attains depth, an opinion strongly supported by the experience of the Negaunee and other mines.—[Lake Superior Democrat.

Ore is going forward slowly for this range. Lack of official figures prevents us from offering comparisons with the business of a year ago, but the difference is large. Tables from the Gogebic show a considerable falling off, while those from the Vermillion prove an increase. The Menominee district is also away behind its record of last year. The Dunn and Shafer mines, of the Crystal Falls range will ship more ore than in 1890. The market is still weak, with no indications of any rise in present low prices.—[Iron Ore.

Very little of an encouraging character is to be discovered in the local situation of the ore business. The Jackson stockpiles were broken for the first time this season on the 6 h by the shipment of a 1200-ton cargo, which had been sold to parties in Pittsburgh. The question of taking advantage of the current low freight rates, in the absence of sales, is one just now being carefully considered by the company.—[Negaunee Iron Herald.

What promises to be a valuable deposit of ore was struck in the East Jackson 175 feet from the surface some ten days ago. At this writing a 5x7 drift all in clean ore, has been driven along the trend and is still in ore. With a view of determining the width, crosscutting will be commenced next week. The ore is a beautiful hard hematite, 67 in iron and well within the Bessemer limit as to phosphorus. The conditions thus far disclosed all point to the early opening of a mine which, with its fine equipment and admirable working shaft, will soon reimburse the stockholders who have all along exhibited a courage in the undertaking, deserving liberal success. So far as we are aware, it is the uniform opinion of experts familiar with the formation that the right thing has at last been encountered.—[Negaunee Iron Herald, July 10.

In the minds of many mining men there is the most massive mining scheme in the Ishpeming mineral basin of any the world ever heard of, save alone, the celebrated one of sinking the Tamarack shaft. The scheme is nothing less than piercing through the vast field of quartzite which lies west of our city with a large double skip road working shaft to reach the great bodies of ore which are geologically known to lie under it. This quartzite field is one of the strongest points in favor of the Ishpeming basin. Its dimensions are, roughly speaking, about three miles long by four miles wide, the length being east and west; it boldly crops out in many places, especially along its northern and southern borders, and is at some points covered by arenaceous slate, chiefly through the central portions. There are certainly bodies of ore here which a little expert exploitation would uncover. The great width of the quartzite would seem to indicate something regarding its thickness, it might probably be from 1,000 to 2,000 feet through it to the ore underneath. A shaft of this kind would cost therefore from $100,000 to $200,000, with the plant necessary for sinking such great depths, but its value to Ishpeming iron field would be beyond measure, for let it once be known that underneath the quartzite lies ore and very shortly we would see many other shafts started. Another very interesting quartzite field is four miles south of Negaunee. This body extends east four miles and is two miles wide, reaching to Goose Lake on the C. & N. W. R'y. Its southern border already supports several mines, chief among which is the Volunteer, its northern border is covered over with immense thicknesses of slate which probably precludes man from ever reaching the ore. Still farther north, however, in the vicinity of Eagle Mills, the slate thins out and the quartzite again appears with diorite back of it, where ore is known to lie. Altogether then there need be no fears concerning the future of this ore basin.—[Lake Superior Democrat.

A prominent mining man, a gentleman way up in the profession, in a recent conversation with a *Mining News* reporter, said it was his honest opinion that the old Iron River mine proper, at Stambaugh, would never again be operated, or, at least, not for many years to come. The gentleman gave three reasons upon which he based his belief. First, the very low grade of ore produced; second, the wet character of the mine, and third, the extremely high royalty demanded by the fee-owners. He thought possibly the Isabella mine, adjoining the old mine, which yields a much better grade of ore, might be worked another year.

The *Mining News* learns that Capt. J. N. Porter has resigned the general superintendency of the Schlesinger group of mines, consisting of the Florence, Iron River and Youngstown, and that there is little possibility of the position again being filled this season, inasmuch as the Florence is the only mine in the group that is being wrought this year.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1891, up to Wednesday, July 8, are as shown by the appended statement:

MARQUETTE RANGE.					
Champion	2,062	Lake Superior	3,983		
Total Marquette Range					6,045
MENOMINEE RANGE.					
Commonwealth	8,299	Florence	19,403	Ludington	46,815
Total Menominee Range					64,017
GOGEBIC RANGE.					
Ashland	52,610	Germania	1,768	Pabst	39,973
Aurora	20,149	Iron Belt	1,506	Ruby	384
Colby-Tilden	9,000	Montreal South	8,615	Sec. 33, South Bessemer	8,235
East Norrie	32,664	Mt. Hope	18,623	Sunday Lake	10,556
Eureka	4,537	Norrie	83,867	West Cary	19,405
Father Hennepin	10,754	Palms	4,319		
Total Gogebic Range					326,048
VERMILION RANGE.					
Chandler	89,516	Minnesota	105,426		
Total Vermilion Range					194,942
Grand totals					591,979

Wire and Wire Rods in the United States.

Our English friends are bewailing the falling off of the American demand for British wire and are endeavoring to find reasons for it. They point out that only a few years ago the imports of the rod billets, rod and finished wire exceeded 190,000 tons annually, but at present the trade is comparatively small, and is every year growing less. The quantity of iron rods imported into the United States during 1890 was 55,427 tons, while the imports of wire and wire roping were but 4,611 tons. The conclusion they reach is that the American wire manufacturers are supplying the demand of this country.

But more important than anything else is the reason why they are doing this. There is no country in the world that consumes so large an amount of wire as the United States. Our consumption of fence wire and telegraph wire is simply enormous, and the chief reason why we supply the demand ourselves is the improved machinery used in the production of rods and wire. The production of our wire rod mills is something immense, as is evidenced by the statements that have appeared in our columns from time to time as the production of the mills at Cleveland, Joliet and elsewhere. The mills already in operation are to be supplemented by others in the neighborhood of Chicago, on the Pacific Coast and at other points, and as it has been on the Pacific Coast that other nations have found the chief market, recently, for their product, it is to be expected that even the reduced imports will be still further reduced.—[American Manufacturer.

Canadian Nickel.

A special correspondent of the Toronto *Globe*, who has just completed an extended tour through the nickel region near Sudbury, states that even the recent mining legislation of the Ontario Government cannot for some time retard the opening and development of mines for this metal. Enough claims, he says, are held free of all restrictions to supply the markets of the world with nickel until the demand reaches enormous proportions. Among other details it is mentioned that Mr. R. P. Travers, of Chicago, has taken out almost 1,000 tons of nickel ore in Drury, while "Mr. Ahn, of Nickel City, is having set up at that place a reduction appliance by which the separation will be made through the application of an electric current to the mercury, thus preventing it (in miner's phrase) from being sick."

A DISPATCH from London, dated July 1st, says: "The Welsh tinplate works, when they resume operations, will run half-time on Mondays, thereby reducing the production by 800,000 boxes annually. This, it is thought, will prevent another glutting of the American market."

TORONTO, $1.00 extra. No extra charge for a stop at Chautauqua or any point west, on the Nickel Plate. Niagara Falls Excursion, July 18th. Limit, five days.

FUEL GAS AND THE SMOKE NUISANCE.

Since Chicago has been wakened up to a realization of the filthy and noxious gases that are being poured forth by the several thousand smoke stacks within the limits of the city, many things are being tried in an effort to better the condition of affairs in this respect. Smoke burners and smoke preventing devices without number have been put on the market, and where they have been put in use have served a very good purpose, so long as operated according to requirements, but they do not appear to be just what is desired, and for this reason a number of fuel gas schemes have been advocated. One company proposes to bring natural gas from the gas regions of Indiana, about 140 miles distant, through a pipe 8″ in diameter. This gas they propose to furnish at prices which they claim will make it cheaper for use in furnaces than coal. The success of the scheme rests with the company. If they can get the fuel here and sell it at a price in accordance with its value for heating and steam making purposes, there is no doubt but as much of it will be used as they can supply, for as a fuel, natural gas is not only much cleaner than coal, but when rightly consumed in the furnace, gives a heat which can be easily regulated, so that a light or intense fire may be had at will and very slight manipulation, and no particular change in the construction of the furnace will be required for its use. Natural gas alone is not all that has been promised, as one or more companies have been formed to supply producer gas. Producer gas is nothing more than what might be termed a fuel gas, as ordinarily it possesses high heating qualities with the illuminating properties quite low, although it is a very easy matter to add the carbon necessary for illumination. The claims made by some of these companies as to the amount of gas they can produce from a given amount of material is rather wild and shows one of two things, either they have no great amount of information on the chemistry of the subject, or that they are flaunting baits by which to entice capitalists; but that matter does not enter into the consideration, so far as engineers and steam users are concerned, for if the gas is supplied at a reasonable figure, it will be used regardless of what it costs the producer. Fuel gas can be, and has been manufactured on a small scale, and its use as fuel in boiler furnaces found to be much cheaper and more satisfactory than the use of coal direct. The apparatus required for the manufacture of fuel gas by the different processes is quite simple and admits of the use of a quality of fuel that could not be employed to advantage when burned directly in the furnace under a boiler. A general idea of the construction and operation of the apparatus may be obtained from a general description of the principles employed. A furnace is provided which is three or four feet in diameter and six to eight feet high, or may be larger or smaller, according to the amount of gas it is required to produce. Into this furnace or generator, the coal is supplied and ignited in the ordinary way, with the exception that the furnace is filled to the top and the draft maintained until the whole of the fuel is at a white heat, at which time the ash pit doors are closed, practically steam tight, and the connection with the chimney cut off. Connection is then made between the producer and the gasometer, which is of the usual form, that of an inverted tank floating in water, and steam, which may be produced from the heat of the generator, is admitted to the ash pit. Here the steam is super-heated and passing through the incandescent fuel is decomposed.

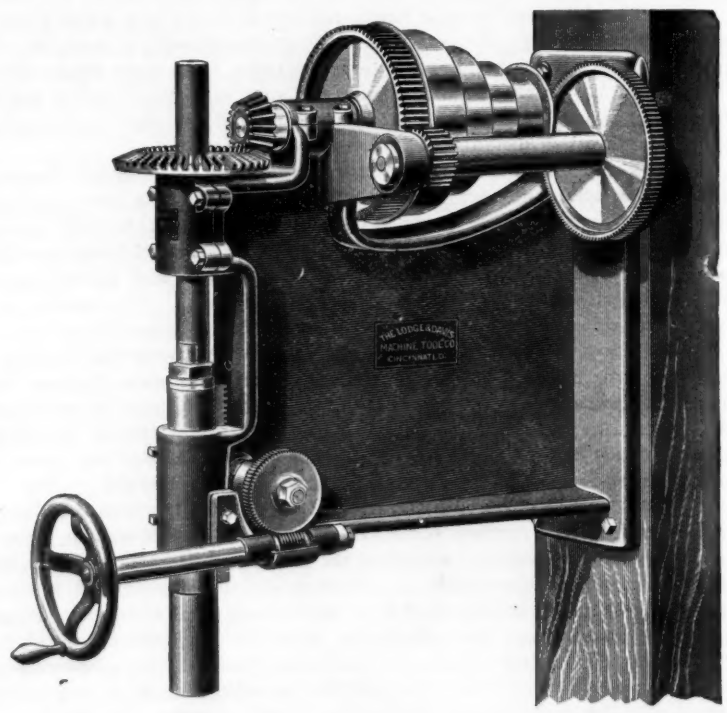
The two gases of which water is formed, oxygen and hydrogen, separate, the oxygen combining with the incandescent carbon maintains a slow combustion, the hydrogen being set free and finding no oxygen with which to combine passes through the incandescent fuel and taking up some of the carbon, forms a hydro-carbon which is highly inflammable, containing a large number of heat units and sufficient carbon to give a flame of considerable luminosity. The combination of the oxygen with the carbon produces carbonic-oxide, an inflammable gas which when heated and during its combustion, by the addition of another equivalent of oxygen, produces a very hot flame developing a large number of heat units. This gas passes off with the hydro-carbon and mixes with it making gas that, even when cold, can be readily ignited on account of the large portion of hydrogen which it contains. Hydrogen, weight for weight, will, by its combustion with oxygen, forming water, produce a greater number of heat units than any other substance known.

The manufacture of fuel gas by the process just described is quite simple and comparatively inexpensive, but there are many modifications of the process. In some cases oils, fats, rosins, etc., are converted into gas by being slowly introduced into the generator on top of the incandescent fuel, which by its heat decomposes the oil, fat or rosin, separating the gaseous from the solid substances, a permanent gas being produced. This being added to the gases obtained from the fuel and the decomposed steam, when steam is used in this connection, the whole being mixed and commingled, passes on to the gasometer where it is held for use as may be required. In another process where the whole or part of those already described is employed, a superheater is also used. In the use of a superheater the heat and gases from the combustion of the fuel while it is being raised to incandescence, is passed through the super heater before entering the stack. The super-heater consists of a receptacle filled with fire brick or other substance which will retain a large amount of heat and attain high temperature. This raises the temperature of the super-heater to a high degree and the manufacture of the gas commences as soon as the connection with the stack is cut off and a blast of steam introduced under the grates of the generator. The gases then formed pass through the super-heater where their combination is more effectually complete, after which they pass to the gasometer, from which the gas can be drawn as required.

The value of the gases formed in this manner depend on the substances employed and the proportions in which they are combined as to whether a carburetted or bi-carburetted hydrogen is produced; also as to whether carbonic oxide or carbonic acid is formed. One pound of hydrogen combined with an equivalent amount of oxygen to form water will produce in round numbers 62,000 heat units. One pound of carbon with a limited amount of air for combustion burned to carbonic oxide, yields 4,452 heat units, but if the same pound of carbon were burned to carbonic acid 14,500 heat units would be produced. From the above it will be seen that the carbonic oxide is still capable of producing 10,000 heat units per pound of gas. The number of cubic feet of the above gases is, approximately, as follows: Hydrogen 192.3; carbonic oxide 13 6; natural gas 26.2; water gas 24 3; illuminating gas 28 7. The comparative value of the different kinds of gas for steam making may be given as follows: Marsh gas, which forms a very large portion of natural gas, is capable of developing 23 500 heat units per pound of gas, while one pound of natural gas will give 22,100 heat units. Water gas, the kind commonly produced for fuel purposes, contains about 8,000 heat units per pound, or in other words, 50 pounds of coal will produce 1,000 cu. ft. of rich gas. The coal from which it is formed will contain about 650,000 heat units, while the gas produced will give something more than one-half of this, or 365,000 heat units, but in spite of this difference it has been shown that the gas, owing to better combustion and application of the heat, will produce work equal to the full heating effect which could be obtained from the coal when used according to the ordinary methods of combustion. The intense heat of the flame produced by water gas, which is about 5 500 degrees of temperature, makes this effect possible. In the production of illuminating gas from bituminous coal approximately, 10,000 cu. ft. of gas are obtained from one ton of coal, but this amount can be greatly exceeded by the addition of hydrogen from the decomposition of the steam in the production of water gas, which will thus be an economical process, providing the heat of the combustion in the manufacture of the gas is used for making the steam; wherein, if the steam was made in a separate boiler, by combustion of the gas produced, no great economy would be found in the use of gas produced in this manner, unless a fuel were used which would be of too poor a quality to be economical when used in a furnace. In nearly every case where a large steam plant is to be operated, economy of fuel would be obtained by first converting the poorer qualities of solid fuel, such as slack coal, either soft or hard, into gas before it was employed in the boiler furnaces.—[Stationary Engineer.

BOILER MAKERS' DRILL PRESS.

On this page we illustrate a drill press designed especially for the use of boiler makers, bridge builders and structural iron works generally, where the work is so large as usually to require some special form of table or support while being operated upon. It will be seen that the machine is proportioned and built with special reference to strength and rigidity. It is intended for the heaviest and roughest work found in shops, and the frame, spindle, gearing, etc., are designed to stand it. The spindle has a vertical movement of 11″; is 3⅝″ diameter below, and 2 5/16″ above the sleeve, and its center is 36″



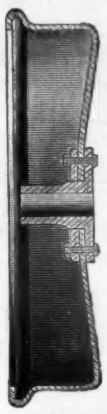
from the post. There is a four-step cone for a 3¼″ belt, the largest step of the pulley being 14″ diameter. This, with the back gears and bevel gears, gives great driving power, while a powerful feed is had by means of worm gearing. The hand-wheel for the feed is extended out in front, as shown, so that it can be easily reached by the operator when he is working on a large sheet, where it would be difficult to reach the feed-wheel if located at the side of or close to the spindle. The manufacturers are the Lodge & Davis Machine Tool Co., Cincinnati, O.

A Ponderous Mill for Armor Plate.

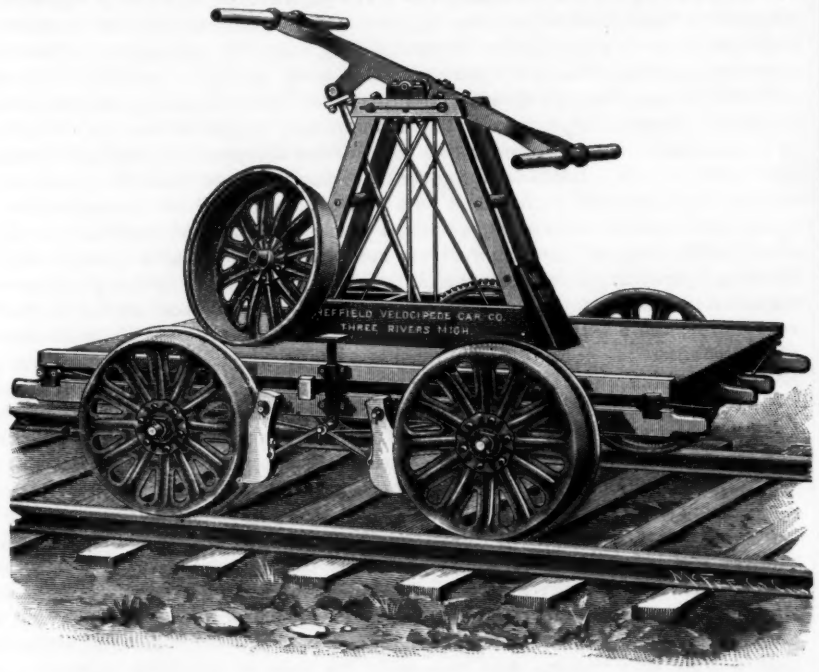
The great armor plate mill at the Homestead works of Carnegie, Phipps & Co., Limited, was put in operation for the first time on Monday morning last. The first metal to pass through the rolls was a steel ingot weighing 11,000 pounds. It required but a few passes through the rolls to reduce this huge piece of metal, nearly a foot and a half square in section, to a plate three inches thick. The first work of this mill recorded a unique achievement in reducing the thickness of the metal by two inches each time it passed through the rolls. Two engines aggregating 3,000 horse-power drive the rolls.

A NEW STEP IN METAL WORKING.

It is well known through historical and antiquarian researches that the ancient inhabitants of the earth possessed a knowledge of certain things in the working of metal that have been lost to those who succeeded them, sometimes entirely; sometimes only in degree. Among the former may be mentioned the act of welding copper, which the ancients possessed, but which has been lost completely, although thousands of dollars have been expended in the search for the process. Of the latter class are some secrets in the working of steel; for although we can do many things with this material that they could not, and in most respects these processes have been carried to a high degree of perfection, yet there are those who claim that the famous blades of Damascus cannot be equaled by even all our boasted progress in this wonderful nineteenth century. Be that as it may, the observing person can in this line, as with every other, constantly see advances made, and at every turn it is more plainly evident that additions are made to the world's stock of knowledge. Our columns are filled with evidences of this from week to week, and we are glad to call your attention in this issue to cuts which are but a further illustration of progress in this particular line alluded to.



In railroad hand cars, lightness, strength and speed are the qualities aimed at, but a great obstacle in the path of the first desideratum has been the wheel. Strength has easily been obtained by the use of cast iron, but wholly at the expense of the weight. Many experiments have been made to overcome this difficulty, but the problem was not solved until the introduction of the wood center steel tired wheel made by the Sheffield Velocipede Car Co., Three Rivers, Mich., and which is well known to all railroad men. This firm



have now, however, gone a step further in this direction, and after many expensive experiments succeeded in producing a wheel from a single sheet of steel, which we illustrate both in section and in use on the car. A sheet of proper thickness to give sufficient strength is sheared to circular shape and, passing through a series of formative processes, is brought to the desired shape, the center being corrugated to give increased stiffness, as shown. A hub, drop forged from a single piece of toughened steel, is then riveted in place and the wheel is complete. The result is a wheel of exceptional lightness and strength, and a distinct addition to the articles made by formative processes from metal. It is also particularly adapted to use on all kinds of light cars for mining, contractors, plantation and tramway use, in the manufacture of which the above firm are specialists.

A NEW STEEL LATH.

Among the many new uses to which steel is being put, one of the most simple and yet ingenious is that of lathing. Decidedly the most meritorious that has come to our notice is the Bostwick Patent Steel Lath, manufactured by the Bostwick Steel Lath Co., a newly organized corporation located at Niles, O.

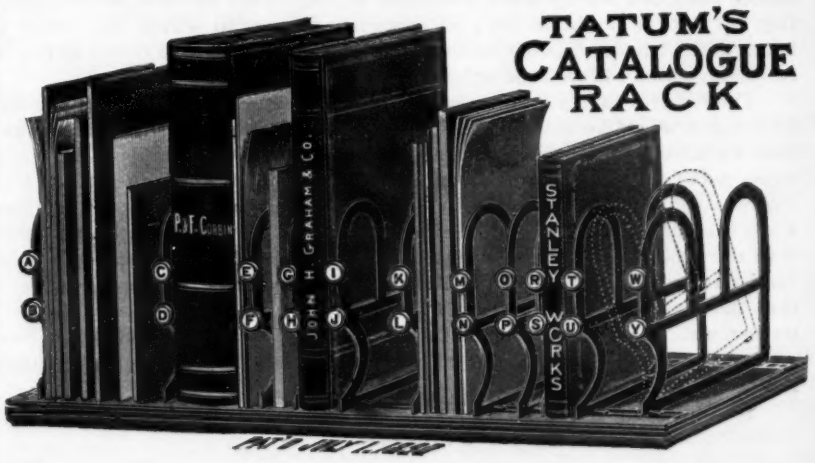
This lath may be described as a sheet of metal corrugated longitudinally, and having between the corrugations certain slits cut in the metal, the metal between the slits being stretched or expanded, forming loops projecting on one side of the sheet. The plaster, when applied, passes under the loop and through the opening, thus forming a double key to the mortar. The general utility of metal laths is recognized at the present time. The superiority of this material over wooden laths need scarcely to be recounted. To certain points, however, we will direct attention. First and foremost is the fact that the lath itself is fire-proof, and that its employment, even with wooden studding and ceiling beams, renders the house or building in which it is employed measurably fire-proof, thereby realizing a large saving in insurance. The ease with which this material may be put in place is likewise refered to among the advantages set forth by the company. They also assert that it has already been demonstrated that a workman can put on about three times more of this metal lath in one day than he can of the ordinary wooden lath. Again, the mason can plaster a much larger number of square feet of this metal lath than he can of wooden lath in the same period of time. Metal lath will make a stronger wall than wooden lath, and one which is less liable to crack in the usual process of settling. The keying secured by the metal loops is superior to the keying obtained by the use of wooden lath, which causes the plaster to be less liable to fall off when jarred by any cause. Again, a smaller amount of plaster will cover the same space, resulting in a still further saving for the metal lath. This saving of plaster follows, because in the first instance the surface to be covered is even and unyielding, and second, the openings being uniform and sufficient to guarantee a strong key, will not admit of waste mortar falling off from the back of the lath. As summing up these advantages and others, the company set forth that a wall finished with this metal lath will cost but little more than if wood lath is used.

The demand for this lath by architects, builders and the trade in Chicago, Cleveland, St. Louis, Cincinnati, Denver, Kansas City, New York, Boston, Baltimore, Detroit, San Francisco, and other cities and towns throughout the East and West, has been such as to make it necessary to locate the factory close by sheet iron mills in order to supply the growing demand for their steel lath with promptness, and to save freights. The Bostwick Steel Lath Co. is now fully organized with a capital stock of $100,000. The factory at Niles is fully equipped with complete machinery, and already in active operation manufacturing the lath. Numerous orders are on hand from various architects, builders, etc., for a large quantity of the article with handsome profits.

The stockholders and directors of this company represent the most prominent citizens of Warren and Niles. The officers and directors are as follows: R. G. Sykes, President, Niles; Geo. H. Tayler, Vice President, Warren; W. G. Hurlburt, Secretary, Youngstown; A. J Leitch, Treasurer, Niles; C. R. Mayer, Director, Niles; J O. Hart, Director, Warren; W. W. Bostwick, Director, New York. Mr. R. G. Sykes will take the active control of the business, and we predict for their company much success, under so capable management.

TATUM'S CATALOGUE RACK.

The Samuel C. Tatum Co., of Cincinnati, O., are having large demand for their catalogue rack, as shown in illustration. It consists of a handsomely finished oak board and the adjustable iron partitions. Any one who has (and who has not?) wasted valuable hours in hunting for this or that catalogue which has been "chucked" into a drawer or pigeon-hole, will readily appreciate the device shown. By means of the adjustment of the partition, every inch of the space may be used; if there are more catalogues to be placed under the letter M than any other, there is no trouble about getting the room. provided a long enough rack is purchased in the first place. The sizes vary from 24 inches to 48 inches by 7 inches wide. The index letters are very neatly and permanently secured to the partitions, and with the rubber feet on the under side, the device seems to be as complete as can be. It should be



stated that the advantage of this form of rack is that it permits of the assorting of both thick books and thin slips, and may be used for circulars as well as heavy catalogues. There seems to be nothing else made which meets these requirements, and the Samuel C. Tatum Co. have a large demand from the iron and hardware trade, where the multiplicity of catalogues and price lists is calculated to weary even Job himself.

Those whose business requires a larger receptacle than the "rack," with card index of subjects, and dust-proof case, will find one of "Tatum's Catalogue Files" (of which we recently gave illustration) precisely what they need. One of these "files" may be seen in daily use in the office of *The Iron Trade Review*, and the "rack" may be found all over the United States.

The Migration of the Iron Industry.

Says the Boston *Commercial Bulletin*: The last hope of seeing the furnace start up again at West Stockbridge, Mass., is destroyed. The machinery, boilers, etc., have been sold to Philadelphia people, who will begin at once to move them to Philadelphia. Truesdell & Fuarey have bought all the real estate and will move the buildings nearer their lime kilns and use them for storage, etc. The Pomeroy iron works were established in 1854 by the Troy iron and nail factory. In 1868, the property was bought by the late Theodore Pomeroy, of Pittsfield. In 1872, the works were destroyed by fire and rebuilt during the same year and were kept in operation until September, 1881, since which time they have been idle. While the furnace was in operation it gave employment to from 50 to 75 men and turned out 30 tons of pig iron a day.

PROTECTING YOUR BUILDING With an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time.

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BRANCH OFFICES:

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ENGLISH IRON AND STEEL INDUSTRIES OF 1890.

The annual statistical report of the secretary of the British Iron Trade Association on the home and foreign iron and steel industries of 1890 is of much interest on this side of the Atlantic. In a prefatory note Mr. J. S. Jeans states that the business done in the iron and steel trades of the United Kingdom during the year 1890 was less, as regards volume, than in the previous year, but prices were well maintained over the greater part of the twelve months, so that the value of the exports, and presumably also of the home trade, was larger, relatively to quantities, than in the preceding year. This would have been much more satisfactory than it actually has been, but for the fact that, generally speaking, only a comparatively small percentage—in many cases none at all—of the increased price took the form of increased profit. For the greater part of the year manufacturers had to contend with the difficulties inherent in a higher range of prices of raw materials, while the cost of labor in general was more than it had been in previous years. When these facts have been duly allowed for it is probable that the year 1890 will, on balance, not come out much, if any, better for iron and steel manufacturers than years that appear to have been marked by more tangible evidences of depression.

A shrinkage of production has taken place almost all along the line. In pig iron, manufactured iron and Bessemer steel there has been a diminished make; but, on the other hand, an increase appears in the production of open-hearth steel, due mainly to the continued activity of the demand for shipbuilding, but also, no doubt, to the greater variety of uses to which this metal is being put. The diminished make of pig iron was largely due to the strike in Scotland, which reduced the output of that country by 200,595 tons.

The exports have not fallen off to the same extent as the home production, and it would be naturally inferred from this circumstance that there has been a slackened demand from home sources. This would appear to apply more particularly to manufactured iron, of which the quantity produced in 1890 was 330,535 tons less than in 1889. It is worth while to point out that while the quantity of puddled bar produced in 1889 was 113,000 tons more than the production of Bessemer steel ingots, in 1890 this relationship was reversed, inasmuch as the make of Bessemer steel ingots was 91,000 tons more than the make of puddled bars. Finished iron, however, continues to hold its own well, as against steel, and in some countries—as, for example, in Russia and in Austria—the older metal is making relatively greater progress than the newer.

The following is a general summary of the statistics of iron and steel in Great Britain for 1890, compared with 1889:—

Description.	1890. Tons.	1889. Tons.
Production—		
Total production of pig iron in United Kingdom	7,875,130	8,245,336
Total production of hematite iron	3,044,160	3,163,063
Total production of basic iron	693,632	669,765
Total productian of spiegeleisen and ferro-manganese	195,030	177,336
Total production of puddled bar	1,923,221	2,253,756
Total production of Bessemer steel ingots	2,014,843	2,140,791
Total production of Bessemer steel rails	1,019,666	943,048
Total production of basic steel	503,400	493,919
Total production of open-hearth steel ingots	1,564,200	1,429,169
Total production of ironstone under Coal Mines Act	8,117,476	8,270,542
Total production of coal	181,614,000	176,916,724
Stocks of pig iron in United Kingdom, 31st December	1,393,041	1,951,443
Total deliveries of pig iron	8,433,532	8,882,601
Shipbuilding tonnage launched	1,276,129	1,288,251
Shipbuilding under construction at 31st December	734,010	872,957
Exports—		
Total exports of iron and steel from United Kingdom	4,001,928	4,188,388
Total exports of pig iron	1,145,268	1,190,371
Total exports of railroad iron and steel	1,035,431	1,091,919
Total exports of tinplates	418,725	430,623
Total exports of coal	30,130,027	28,974,129

—[Colliery Guardian.

WROUGHT IRON BY A NEW PROCESS.

The Harriman (Tenn.) Wrought Iron Co. has successfully produced wrought iron from ore without the aid of a blast furnace. So says the Harriman *Advance* of late date, which describes the Neville process employed, as follows: "The furnace is very much like a puddling furnace, or more probably might be likened to a coke oven. The front end at the chimney is two stories in height, while beyond are the ovens, four in number, the last being the full oven. In the oven raw coal is placed, that from the Byrd mine being used, which does not form into a clinker. The fire is kept up by the blast of a blower, and the heat and flame is driven through each oven and chamber and then out of the chimney. The ore is fed into a crusher, which leaves it in a granulated condition; then it is conveyed by a car to the top of the two-story oven. This oven is more properly called a chamber, where the ore is roasted at 1,200 degrees Fahrenheit. When it arrives at a proper condition, which is known by the puddler, it is raked down into the lower chamber, where it is desulphurized at 1,800 degrees; then again, the puddler knows at just what point to rake it into the deoxidizing chamber, where it is subject to a heat of 2,000 degrees, and when ready it is raked into the puddling furnaces and raked along through three of the furnaces; when it reaches the last oven the heat is about 3,500 degrees. The dross or slag begins to assume the form of liquid, and the iron becomes like wax. Then the puddler works the mass into a ball, which is taken by tongs and a swinging hoist from the oven into an iron hand cart and is conveyed to a steam hammer which delivers a blow of 45 tons. A man with a pair of tongs turns the mass of hot iron rapidly over; while doing so, the slag or dross runs like water out of a sponge which is being squeezed. It is hammered into a bloom about five inches square and eighteen inches long. One thousand pounds of ore is placed in the furnace every hour, and a ball can be drawn every fifteen minutes, which produces a bloom of about 100 pounds, or for 1,000 pounds of ore 400 pounds of bloom is produced, which equals a 40 per cent. production. The *Advance* representative spent a part of Wednesday night at the furnace, when it was charged; in about six hours the iron was in a condition to take out. Yesterday afternoon our representative again went to the furnace and saw the second draw, which was made at about 6 o'clock. This morning our representative went to the furnace and carefully examined the blooms. They appear to be very solid and firm—when struck with a hammer they give a clear ring. It is very evident that the slag is nearly all removed. Some of the iron was placed in a forge and worked. It appeared to be of good firmness and cohesion. It has, apparently, tensile strength and good quality. The puddlers are from some of the largest rolling mills of Pittsburgh, Pa. They say it is their opinion that in time this process will supersede the present puddling method, and that when the Neville blooms are reheated and rolled they will be very satisfactory iron. During the process of puddling the draft is frequently changed to a greater or less force, and the dampers of the chimney are manipulated. In making pig iron there is only a production of 35 per cent; to make into wrought iron there is a loss of 12 per cent. Mr. Neville claims a production of 40 per cent. and only 5 per. cent. in rerolling. The Wrought Iron Co. will now erect 11 more furnaces, which will require only one more engine and blower.—[Manufacturers' Record.

TRADE journals are even more indispensable to the wholesaler and wholesale interests than to the retailer if a comparison be made. As an advertising medium the trade journal is a "short-cut" to the retailer. A thousand dollars judiciously expended in the trade journals will reach the eye of more retailers in any given line than double the amount in daily or weekly newspapers, or even magazines. The daily papers would reach more readers, but not more readers in the particular line sought. Then, too, the retailer looks upon his trade journal as a sort of directory. If he wants any special line of goods not sold by his regular wholesale house, his first recourse is to his trade journal. —[Coal Trade Journal.

THE completion of a great bridge across the Arkansas at Fort Smith has just been celebrated with great *eclat*. The completion of this bridge on the Kansas & Arkansas Valley Railroad means the opening up of rich mineral lands abounding in iron, lead, zinc, antimony, manganese, coal and coal oil. Timber forests, which have been out of reach for want of transportation facilities, will also be traversed, and will yield billions of feet of merchantable timber.

A RECENT English trade paper says: "The depression in the iron and steel trades of South Wales and Monmouthshire is felt more seriously than has ever been known before. Orders for legitimate business, such as rails and sleepers, have not been so scarce for years. The rail and other mills of the Rhymney Iron Co. are standing still, and those of another important company in the district are idle, whilst others are working short time.

NICKEL PLATE Niagara Falls cheap rate excursion. Saturday night, July 18th. Limit, five days, stop at Chautauqua or any point west without extra charge. Inquire of agents.

STEAM USERS Should Read this.
Increase the Capacity of your Boilers.
Scale is a Non-conductor of Heat.

SAVE YOUR FUEL AND PROTECT YOUR BOILERS FROM SCALE AND GALVANIC ACTION OF WATERS. WATERS ANALYZED **FREE** AND THE COMPOUNDS MADE TO SUIT EACH WATER.

INTERNATIONAL BOILER SOLVENT.
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Manufacturing and Analytical Chemists, W. H. EDGAR, Manager. Office, Room 29, Rialto Building; Works, 4246 Champlain Avenue;
Ohio Office, Canton, O. ROBERT H. CREVOISE, Agent.
WRITE FOR INFORMATION AND PRICES. BEWARE OF INFRINGEMENTS.
CHICAGO, ILL.

PROGRESS OF THE AMERICAN TINPLATE INDUSTRY.

The *Bulletin* of the American Iron and Steel Association, current issue, contains the following important and authoritative article:

The readers of our Annual Statistical Report, issued in April last, will remember that we printed in that publication the first complete and authentic statement of the work which has been done up to that time toward establishing the tinplate industry in this country. Since that report was issued, encouraging progress has been made in the building of the tinplate works which were then under way, and new tinplate enterprises have been started. To show the status of the new industry on July 1, when the new duty on tinplates went into effect, the enterprising *Mail and Express*, of New York, in its issue of that date, printed letters obtained from responsible members of firms and companies already engaged in or preparing to engage in the manufacture of tinplates, or of the black plates essential to the tinplate industry. These letters give positive and reliable informatfon concerning the present condition of the infant industry, which differs greatly from the false statements and wild theorizing of ignorant or malicious writers which have been so industriously circulated by the Free Trade press. We cull from the letters in the *Mail and Express*, which makes up two pages of interesting reading in that paper, the portions which show the exact state of the work at each establishment.

W. C. Cronemeyer, Chairman of the United States Iron & Tinplate Co., of Demmler, Pa., states that "with the present facilities we are turning out 400 tons of black plates and 100 tons of tinned plates monthly, and the new additions will enable us to add, within six months, 400 tons per month more of tinned plates to our output."

P. H. Laufman, of the Apollo Sheet Iron Works, of Apollo, Pa., sends the following information: "It is now an accomplished fact that we are making, have made, and shall continue to make terne plates. The sheets have been approved by the highest authorities in this country, experts and architects of undoubted abilility. Our output has been limited to about 100 boxes (14x20) per day. We are now putting in two more pots, which will give us a capacity of 200 boxes (20x28) or 400 boxes (14x20). We intend to confine our product entirely to terne or roofing sheets. We can not fill half the orders we are receiving."

Fleming & Hamilton, of Pittsburgh, inform the editor that "we are and have been making tin and terne plates for about six months in a limited way. We have about 20 hands, and turn out about equal to 50 boxes of 14x20 plates per day."

Norton Bros., of Chicago, who manufacture immense quantities of tin cans, say: "Should you visit the works of Norton Bros., at Maywood (near Chicago), you would see in operation there a small plant of the apparatus used for tinning by the English method. We took pains to get the best machinery used there. Fair work can be done by it, but we are not very proud of it except as an example to shun. When you see it in operation you will not think it strange that we are very confident of our ability to devise machinery that will do the work better, and that we are already constructing machines to work in a more American fashion. At Maywood, a steel furnace and rolling mill have been erected within the year for this tinplate business. Our firm paid in 1890 about a million dollars for tinplate."

F. G. Niedringhaus, President of the St. Louis Stamping Co., of St. Louis, Mo., describes the condition of his tinplate plant as follows: "We are now largely extending our works, so that by the 1st of August at the latest, we shall be employing about 600 hands in this single line and turning out from 500 to 600 boxes of tinned plates a day. Just now we are simply tinning in one set of rolls such plates as we have to spare, as we are needing all the plates we can manufacture in black tin, and our sole object now in making the bright tin is for the purpose of breaking in some of the mills, so that we are not turning out now more than from 25 to 40 boxes a day. We have three experimental sets of tinning pots, each of which is capable of turning out from 25 to 40 boxes per day. But the new works now being completed will have from 10 to 15 different sets of tinning pots."

The N. & G. Taylor Co., of Philadelphia, reports as follows: "We have a complete plant, from the finishing of the black sheets down, which includes pickling, washing, scouring, coating, etc. We have a set of pots that we are using that were imported since the 1st of January, from England, and within a day or two we gave an order for another complete stack. The capacity of our plant in the dipping department is about 40 boxes a day, but it is our intention to still further increase this. We are running every day, but, naturally, not to the full capacity; all our workmen not being familiar with the manufacture of plates, it is necessary for us to go along very carefully. We are selling the plates as fast as made."

Marshall Brothers & Co., of Philadelphia, report that "we are preparing just at present to make first-class terne or roofing sheets. We have been for a few years past making what we call a lead-coated sheet. Since the new duty has come into effect we are branching off into terne sheets. We have at present two pots, which double our capacity in that direction. We are converting the lead-coated baths into terne baths, and we purpose to cater to the consumer and make long sheets. The sizes will be twenty inches wide, and six, seven and eight feet long. We do not care to make any of the small sizes, for our tin will be used entirely for roofing purposes and gutters. As to the quantity which we are turning out, it is not much at present, owing to the fact that we have not much of the stock yet, but within the next month our capacity will be largely increased."

Somers Brothers, of Brooklyn, N. Y., who manufacture large quantities of decorated tinplate packages, and who are Democrats in their political affiliations, write as follows: "To-day we are erecting, on a lot adjoining our Brooklyn factory, a building to be 305 feet long and 76 feet wide, to be constructed of iron, brick, stone and glass, with slate roofing. The rolling mill part of the building will be two stories, 61 feet in extreme height, and the other section 88 feet high. This building alone will cost $60,000, and will be occupied as a tinplate works. In addition to the building there are now on the way to our factory large quantities of heavy machinery, such as a Corliss 600 horse-power engine to supply power, rollers for producing steel sheets, and much other improved machinery. We expect when our works are completed, which will be some time within the year, to manufacture not only enough for our own use, but in addition we shall turn out about 2,000 boxes a week for sale."

The Britton Rolling Mill Co., which is a new company that has recently completed a large plate and sheet rolling mill at Cleveland, says that "our tinplate department will be in operation some time in September next, and we will be able to turn out about 1,000 boxes of bright and terne plates per week. We intend to add three or four more mills, and hope to have them in operation by January 1, 1892; these will increase our output to from 3,000 to 4,000 boxes per week."

F. R. Phillips, who writes concerning the Welsh-American Tinplate Co., of Philadelphia, says that "this company has sufficient capital subscribed to begin operations at once. The company will make tin and terne plates and sheet steel. The mills will be built on a site on the outskirts of Philadelphia, which has already been selected, and work be begun as soon as possible. In fact, the contracts are already out, and their completion has been stipulated, so that they can be placed on the market not later than the 1st of January next."

The Falcon Iron & Nail Co., of Niles, O, announces that "we at present manufacture black sheets of all sizes down to No. 30 gauge, which is the same as that from which I C tinplate is made. It is our intention to engage in the manufacture of tin and terne plate as soon as we have concluded investigations now under way of the different methods of tinning sheets, in order to arrive at an intelligent conclusion as to the best method."

James Wilson, President of the Bellaire Nail Works, of Bellaire, O., writes: "We do not contemplate engaging directly in the manufacture of tinned plate, but are preparing to furnish the steel bars or plates used in its manufacture. A number of those who are preparing plants to produce the finished article expect to buy the bars or sheets they will use, and we are preparing to meet this want. Of course the construction of plants requires time, but at many points this work is being vigorously pushed. We have no doubt of the success of this new American industry."

The Canonsburg Iron & Steel Co., of Pittsburgh, Pa., makes the following statement: "In our works at Canonsburg, Pa., we have started in on tinplate, and outside of our regular trade for stamping iron and steel are making two to three car loads of black plate per week, which is being tinned by the purchaser. We are enlarging our mill and will employ 100 additional men, and when completed will make about twenty-five tons per day. Of course we could not and do not intend to devote our entire mill to this new industry, for we must retain and take care of a large trade for specialties for which our mill is well known and adapted; but we are enthusiastic on the new industry, and propose to work for it as hard as the writer did for American watches."

From the above letters it will be seen that there are at the present time in the United States six companies which are actually making tin or terne plates in commercial quantities, three other companies which are building tinplate plants on a large scale, and two others which propose to build tinplate plants soon, while two more works are already increasing their facilities for supplying black plate, thus showing their faith in the tinplate enterprises. We think this is an excellent showing as the result of less than one year's work. It is true that the quantity of tinplates turned out by any one of the existing works is not large, but it is being increased as rapidly as circumstances will permit. The critics, who make a pretense that they expect us to rival in a single year the operations of Welshmen in an industry which they have been generations in building up, are being answered by hard facts, and by facts which they did not expect.

CENTRAL THOMSON-HOUSTON COMPANY,

48 ARCADE, CLEVELAND, O.

S. D. NESMITH, - - - - - Manager.

Motors from 1-12 h. p. to 100 h. p.

ELECTRIC LIGHT PLANTS INSTALLED,

Arc and Incandescent, Direct and Alternating,

ELECTRIC FANS!
FANS FOR VENTILATING!
ELECTRIC SUPPLIES.

THE LARGEST STEAM HAMMER EVER BUILT.

The new 125-ton steam hammer just completed for the Bethlehem Iron & Steel Co. continues to attract general attention. The hammer is the largest ever built, not excepting that of Schneider & Co., of Le Creusot, France, which has a 100-ton capacity. The Bethlehem hammer was designed by John Fritz, superintendent of the company. It is enclosed in a special plate manufacturing building in company with an armor plate rolling mill and a 6,000-ton plate bending press. The hammer stands some 60 feet high and covers a floor surface 42 feet square, and is of the usual A-frame construction. The steam cylinder is 6 feet 10 inches in diameter, and has a stroke of 16 feet 6 inches. The total weight of piston, piston rod, ram and die sums up to 125 tons. The foundations for the hammer and anvil are independent of each other and the space between is filled in with crib work. The hammer foundations consist of a pair of heavy walls 30 feet in height, laid parallel and north and south of the anvil foundation. These walls rest upon piles driven to rock bottom. Between the walls and upon piles closely driven to rock bottom is erected the anvil and its foundation. The foundation consists of a timber frame work supporting several layers of iron and steel slabs arranged in longitudinal and transverse layers. The anvil is made up of 22 solid cast-iron blocks, averaging about 70 tons each in weight. The anvil block upon which the material is to be hammered is faced with steel, and measures 11 feet in length, 6 feet in width at bottom, 2 feet in width at top, and a depth of 4 feet 6 inches. Associated with the hammer and its work are a pair of pneumatic cranes, capable of moving 300 tons each and of effecting all the various motions necessary to a steam hammer. The weight of plates, etc., to be handled, ranges between 20 and 100 tons in weight.

The Bethlehem *Times* gives this enthusiastic description of the first test of the great hammer: The steam hammer has started. The world's greatest forging machine is now in active operation and ere long—as soon as ingots of the required size have been cast—the Bethlehem Iron Co.'s ordnance department will produce the heaviest and strongest armor plates ever made. Known to but few, a piece of ingot 36 inches in diameter and about 8 feet long was taken into the hammer building yesterday afternoon and placed in one of the large furnaces at the South side of the hammer in readiness for heating. At 10 minutes to 11 this morning it was taken out by the crane to the right of the hammer looking north, and placed on the anvil. The ingot was attached to a porter bar which entirely encircled its unheated end. At the handle of the bar, which is about 25 feet long, ten workmen were stationed to assist in handling the ingot. Miss Nora Weaver, the daughter of Wilson Weaver, to whom was accorded the honor of first working the levers of the hammer, mounted the platform and at the signal raised the 125-ton ram to the height of about 7 feet, shut off the steam, and the ponderous hammer fell with full force on the ingot, sinking therein to a depth of about 6 inches.

The crane puffed, the ingot was moved, placed in position and the second blow was struck. Three moves flattened it out so that its circular shape was lost, and it was turned so the rounded sides presented themselves to the anvil blow and ram above. Blow now followed blow in rapid succession and the part being forged soon was a foot square and 6 feet long. The pounding was kept up for 25 minutes. The hammer was not tested to its full capacity, as circumstances did not require this, the highest it was raised being 8 feet, whereas it has a play of 16¼. The sight was intensely interesting; the working of the trip, crane, levers, ingot and all making it a scene never to be forgotten by those who witnessed it. The piece that was forged was intended for a porter bar to be used hereafter in connection with the forging of armor plates. Its end will be square, though the end of the one used this morning was circular. After about 30 blows had been struck the ingot was taken back into the furnace for reheating by the large crane, the working of which was by no means the least interesting spectacle to be seen. This, as well as its twin companion on the other side of the hammer, is endowed with a series of motions almost incomprehensible to one who has not seen it working.

Steel Axle Boxes.

The substitution of steel for iron has been successful in the case of many of the fittings of freight and passenger cars, but hitherto it has not been found practicable to make the axle boxes out of anything but cast iron. The breakage has, however, been enormous, since it is almost impossible to secure iron that will make trustworthy castings.

A foreign firm has recently patented a machine which does away with a a large annual loss by making a wrought steel box that is not expensive. The steel is delivered to the machine in plates a half inch thick, and the box is produced by a series of presses which cut the metal to the required shape, and the machine then folds the pieces to form the box. The boxes are much stronger and much lighter than the old style cast iron boxes.

IT WILL PAY

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THE HACKNEY POWER HAMMER,

Endorsed by leading Manufacturers throughout the Country.

Catalogues and all information cheerfully furnished by

THE HACKNEY HAMMER CO., Cleveland, Ohio.

INDUSTRIAL SUMMARY.

New Enterprises:—

The Jones Foundry Co. have been organized at Columbus, O., with a capital of $30,000.

M. H. George, P. G. Bowman and G. R. Harsh have incorporated at Birmingham, Ala., the George Car Coupler Co., with a capital stock of $250,000.

C. H. Tise will establish machine works, manufacture pump fixtures, etc., at Winston, N. C. The contract has been let for a building 3 stories high 30 x 120 feet.

The Standard Air Brake Co., of East St. Louis, Ill., has been incorporated with a capital stock of $4,000,000. The incorporators are Geo. E. Paul, Frederick Weseman and Chas. H. Linehan.

It is announced that a party of Philadelphia capitalists, among them Albert Murphy of the Conshohocken Tube Works, will shortly visit Duluth, Minn., and vicinity, with a view to establishing tube works in that territory.

The Southern Electric Co., of Lynchburg, Va., has been incorporated with C. P. Poole, President, and C. W. Poole, Vice president, for the purpose of manufacturing electrical apparatus. The capital stock is to be not less than $5,000 nor more than $25,000.

The establishment of car works at Beaumont, Tex., says an exchange, has become an assured fact, the necessary papers having been signed by the contracting parties. The citizens of Beaumont grant a bonus of $50,000 to Eastern capitalists, who will build and operate works employing 500 men, the paid-up capital stock of the company to be $500,000.

The Hardsog Mfg. Co., Ottumwa, Ia., has been recently incorporated, with a capital stock of $30,000. This new concern succeeds to the business of Martin Hardsog, who burned out in March last. They will make a specialty of coal-drilling machines, coal miners' tools and steel body ore and pit cars. They will soon occupy their new factory building, which is considerably larger than the one burned, and which will be equipped with new machinery throughout.

The following are among the new incorporations in Illinois: The Columbian Electric Works, Chicago; capital, $3,000,000; incorporators, S. E. Moore, L. S. Day and John Irvine.—Standard Railway Gate & Manufacturing Co., Chicago; capital, $300,000; incorporators, L. M. Meek, T. M. Meek and O. R. Trowbridge.—The Burson Manufacturing Co., Chicago; capital, $100,000; incorporators, Wm. W. Burson, Grant Newell and Arthur B. Camp.

The Shenango Valley Steel Co. has been organized at New Castle, Pa., with a capital stock of $200,000, all of which is stated to have been subscribed. The following are the stockholders of the new concern: W. E. Reis, Geo. Grier, Leander Raney, Jos. A. Crawford, Geo. G. Berger, J. W. Stevenson, Jr., A. M. Thompson, J. P. H. Cunningham, S. W. Cunningham, Chas. Woodward and L. S. Hoyt. Geo. B. Berger has been selected as treasurer. The new concern expects to turn out about 400 tons of Bessemer steel per day. Work on the erection of the plant will be commenced at an early date.

The projectors of the Elwood Tin Plate Co. met in an important business meeting in this city. The gentlemen present from out of town were: W. B. Leeds, of Richmond, Ind.; I. L. Morris, Cleveland; William Z. McDonald, State Inspector of Shops and Factories; J. L. Woodward, Chicago; F. M. Boyer, Indianapolis, Ind. and Newton Ford, Elwood, Ind. In addition to the above named parties, Col. A. L. Conger, Col. Geo. T. Perkins, Monroe Seiberling and F. M. Atterholt are the Akron capitalists who will be interested in the management of this new industry. It was decided that work on the erection of the new plant should begin immediately. The mammoth works will be located at Elwood, and when complete will give employment to a force of 300 men. This factory will be the first strictly tinplate works erected in the United States.—[Akron (O.) Beacon.

Additions, Enlargements, Removals, etc.:—

The Gouverneur Steel Roller Manufacturing Co., will remove their works from Gouverneur to East Geneva, N. Y.

Messrs. James, Pender & Co., who are large manufacturers of nails, at St. John, N. B., are building a new nail factory.

The Knowles Steam Pump Co., at Warren, Mass., are building a new boiler house, and work will soon begin on a 40x75-foot extension to the iron foundry.

The Bellaire Stamping Co., a comparatively new concern at Bellaire, O., and one of the largest in that vicinity, has announced its intention of removing to Hammondsport, Ind.

The Southern Steel Co., of Birmingham, Ala., are considering an increase in the capital stock from $100,000 to $1,000,000. A meeting will be held at an early date to take action on the proposed increase.

It is announced that the Tripp Manufacturing Co., of Boston, have decided to locate new works at South Framingham, Mass. The company have

THE STIRLING COMPANY

MANUFACTURE

The Safest, Most Economical, Compact and Durable High Pressure

WATER TUBE BOILERS.

All Wrought Steel. Large Mud Drum. Perfect Circulation.

By removing four manhole covers access is gained to every part of the boiler. Dry steam and great economy of fuel guaranteed.

GENERAL OFFICE: Pullman Bldg., Chicago. PITTSBURGH OFFICE: Lewis Block. NEW YORK OFFICE: 74 Cortlandt St.

Works: BARBERTON, SUMMIT COUNTY, OHIO.

THE LEFFEL WATER WHEEL & ENGINE CO.

Build a Splendid Line of SELF-CONTAINED SIDE-CRANK **ENGINES**

—AND—

RETURN FLUE **BOILERS**

8, 12, 16 and 20 Horse Power.

High in Grade. Low in Price. Strictly First-class. In design and construction SUPERIOR to all others. Write for ENGINE PAMPHLET.

Address us in full as follows:

THE LEFFEL WATER WHEEL & ENGINE CO.

Greenmount Ave., SPRINGFIELD, OHIO, U.S.A.

a capital of $250,000, and will erect a factory 240x60 feet, contract for which has already been let.

The New Home Sewing Machine Co., at Orange, Mass., is to erect at once a four-story brick building 250x50; a two-story brick building 106x50, and a brick office 60x50. The seven water wheels will be increased to eight.

Waring, White & Co., have perfected plans for the erection of a large foundry and machine shops, at St. John, N. B. Seven buildings in all are to be erected, which will be thoroughly equipped with modern machinery for turning out all kinds of castings and machinery in the shortest possible time.

Fires and Accidents:—

The machine shops of William Dunkerly, Jr., at Paterson, N. J., have been burned at a loss of $5,000; insured.

A fire in the Alabama Rolling Mills, Birmingham, Ala., destroyed the engine-room and considerable machinery. The loss is $20,000, covered by insurance.

General Industrial Notes:—

The Hughes Steam Pump Co., Cleveland, O., are making a pump for Benton Harbor, Mich., for city water supply of one and a half million gallons daily capacity.

The Elmira (N. Y.) Board of Trade is raising a new subscription fund of $50,000 or more to be available from time to time to obtain funds necessary to secure manufacturing industries for the city.

The Tennessee Range & Manufacturing Co., of Evansville, Ind., has been succeeded by the Indiana Range Co., a new corporation with a capital stock of $75,000. The new company have purchased the entire assets of the old concern, remodeled the works and increased their facilities.

The Thompson Electric Welding Co., of Lynn, Mass., have put in their works a 50-lb. Hackney power hammer, manufactured by the Hackney Hammer Co., Cleveland, fitted with special dies for knocking down burr on pipes and bars after welding. This hammer is meeting the requirements of the trade in general most satisfactorily, and we predict for it a brilliant future.

Concerning the fire which visited the Tonawanda Iron & Steel Co., Tonawanda, N. Y., July 10th, we are authoritatively informed that the frame stock house, which was the only frame or inflamable building connected with the works that was burned, disabled the hoist tower. Nothing else was damaged, and the furnace was in condition to be immediately banked, so that the company hope to resume making iron as soon as a new hoist can be built, which should be done within three weeks.

The well known firm of Hartman & Durstine, of Wooster, O., manufacturers of sliding blinds, has been dissolved, and the business will be continued under the name of the Hartman Sliding Blind Co. Mr. J. B. Hartman, who is the patentee of these popular blinds, has quite lately secured two more U. S. patents for valuable improvements on his sliding blinds, thus making in all, up to date, seven patents on same, with two more applications now pending in the patent office for other important improvements. They have just shipped a large order of these patent blinds to Washington, D. C., for one of the finest hotels in that city, now being completed, the blinds alone costing about $2,000. They are also now completing the fourth order for the fine Government buildings at Fort Logan, Denver, Colo., the sliding blind bill amounting to over $2,500. These are a few of the many orders that they are constantly receiving. See advertisement on another page in this paper.

A New Phase in Steel Making.

The first results of a new process of steel making have just been reached by the running of the first heat from a new experimental open-hearth furnace, at the Sheffield Technical School. The process is the outcome of the researches of Professor Arnold, and consists in removing all the impurities from Swedish pig iron, with the exception of the exact proportion of carbon required for a given purpose, thus obtaining the ideal carbon and iron steel, homogeneous in structure and free from blow-holes. These results are said to be obtained without the presence of more than mere manganese or silicon, and also without the use of iron ore. The average time occupied by this process in the conversion of a ton of pig iron into the highest class of steel yet made will be about three hours, the fuel used consisting of about half a ton of rough slack. The run is stated to have been perfectly successful, the ingots showing a very high quality steel. It is anticipated that the range of metal produced will vary from what will be practically wrought iron to the hardest tool steel. The new furnace, together with the general plant, was designed to Professor Arnold's specifications by Mr. B. H. Thwaite, C. E., and is intended to produce three tons of steel in the 24 hours.—[Glasgow Engineer.

Lake Chautauqua, the Queen of Summer Resorts.

At a lake of cool crystal water, located among the beautiful highlands of the Empire State, 150,000 people seek each Summer season the delightful rest always found in that wholesome atmosphere. Chautauqua: the famous resort! located between 1,400 and 1,500 feet above the ocean, whose facilities for boating, fishing and bathing are unsurpassed, and combine these pastimes with the advantages made possible through the educational and religous organizations, which make Chautauqua Lake their Summer headquarters, is it suprising that each season, thousands frequent its shores?

With hotel accommodations capable of delighting the tastes of the most fastidious, and boarding houses where families may secure commodious rooms and excellent service at reasonable rates, should it be wondered at that people flock from the smoke, dust and heat of our cities to enjoy the pleasures and benefits obtainable on the shores of this lake of springs.

Tourists selecting the Nickel Plate route to this queen of Summer resorts will find accommodations desirable in every appointment. Excellent connection is made for Chautauqua Lake, at Brocton Junction, N. Y., and from Mayville, N. Y., any point on the lake may be reached via boat or rail. Passengers holding tickets via the Nickel Plate to Niagara Falls, may secure stop-over at Chautauqua free of charge.

Be sure your tickets read via the Nickel Plate.

A Safety Mine Elevator.

An English mining engineer has invented an ingenious device to prevent accidents in the case of the breakage of an elevator rope. In the center of the winding rope is a copper wire which carries a current of electricity to electro-magnets which hold back grips pulling against springs. The current is broken by the fracture of the rope, the grips are released, and by the action of the springs they come in contact with the guides. The advantage of this method of securing safety over the ordinary mechanical catches is that they do not come into play by the slacking of the rope.

Rates to the Niagara Falls

As low as ever. Accommodations strictly first class. Take the Nickel Plate Saturday night, July 18th, and lose no time from business. Limit, 5 days. Toronto, $1 extra. Stop at Chautauqua, or points west, without extra cost.

ELEGANT Pullman day and sleeping cars will be run on the Nickel Plate Niagara Falls Saturday Night Excursion, July 18th. Returning stop at Chautauqua, or points west, until July 23d, without extra charge.

It is not a Dead, but a Live Elastic Packing.

Patented Dec. 27, 1887.

BEFORE USING.

That will pack a Steam, Water, Oil, Air or Ammonia Rod, also a Smooth, Fluted, Out-of-Round or Vibrating Rod, an Engine, Pump, Ice Machine, Air Compressor, Steam Hammer, Rotary Rod, or any rod that has to be packed, and keep it tight without pressure or friction, as it works automatically.

We will prove this by yourself. If you will send for enough to pack a rod, we will send it on 30 days' trial, and prove to you that the "Sensible" Automatic Packing is the "Best" made, therefore is "Cheapest."

SOLE MAKERS:

AFTER USING.

Sensible Automatic Packing Co., 63 So. Canal St., Chicago, Ill.

CLEVELAND

GALVANIZING WORKS.

H. H. HODELL & CO.,

Galvanizing in all its branches, and Manufacturers of Rubber Buckets for chain pumps.

CLEVELAND, OHIO.

FOR SALE.

1 $250 BOND - First-Class Security.

Bearing 8 per cent., payable semi-annually.

WANT TO REALIZE AT ONCE. ADDRESS,

W. N. C.,

Room 1, 29 Euclid Ave., CLEVELAND, O.

PERFORATED METALS OF EVERY DESCRIPTION BY THE HARRINGTON & KING PERFORATING CO. CHICAGO.

284 Pearl St., cor. Beekman. NEW YORK.

Plate Iron Washers
A SPECIALTY!
Even in Gauge, smooth and well finished.

Cut from new plate, rolled expressly for the purpose. Write for prices, Address,

MILTON MFG. CO., Milton, Pa.

SAMPLES & PRICES ON APPLICATION

ALUMINOUS METAL ROOFING.

EAVE TROUGHS, CONDUCTOR PIPES, VALLEYS, SHINGLES & SUPERIOR TO COPPER AT PRICE OF TIN. SOLE MFGRS. NON-CORROSIVE. REQUIRES NO PAINT FOR PROTECTION.

STAN-ALUMIN METAL CO., CANTON-O.

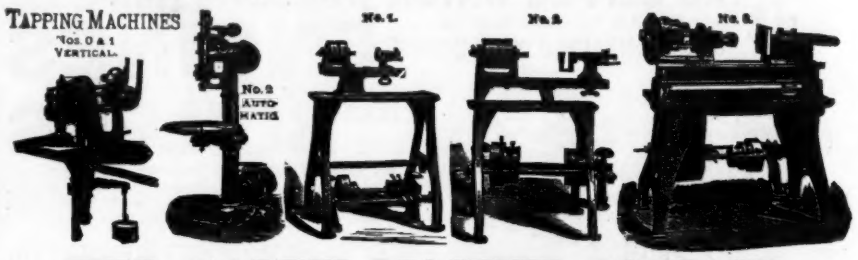
THE ROBERT AITCHISON PERFORATED METAL CO.

CHICAGO, ILL.

PERFORATED METALS OF ALL KINDS

OFFICE 510---265 to 269 DEARBORN ST.
WORKS AT SOUTH CHICAGO.

OUR LINE OF TAPPING MACHINES.



THE GARVIN MACHINE COMPANY,

Manufacturers of, and Dealers in, all kinds of

MACHINERY AND MACHINE TOOLS.

Universal and Plain Milling Machines, Drill Presses, Screw Machines, Hand and Engine Lathes, Planers, Profilers, Chucking Machines,

Gear Cutters, Die and Cutter Grinders, Tapping Machines, Wire-Spring Coilers, Milling Cutters, &c.

Plants for Manufacturers of Sewing Machines & Electrical Goods.

GEAR-CUTTING AND MILLING IN ALL ITS BRANCHES.

Laight & Canal Sts. [Catalogue sent on Application.] NEW YORK.

DIXON'S GRAPHITE PAINT

THOSE who use it say that one pound will cover 2 to 3 times more surface and last 4 to 5 times longer than any lead, mineral or metallic paint. A tin or iron roof well painted will not require repainting for 10 to 15 years.

JOS. DIXON CRUCIBLE CO.,
Jersey City, N. J.

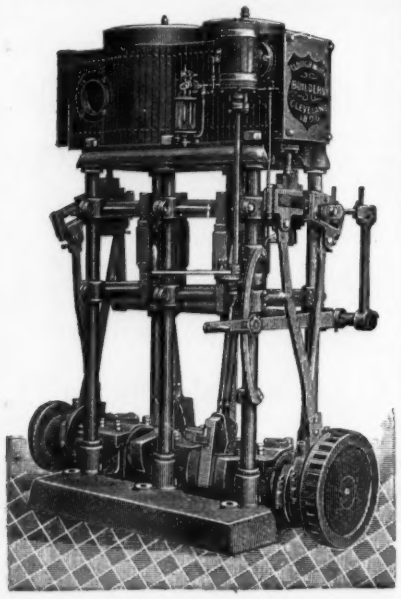
PORTBLE, HAND OR BELT **PIPE CUTTING & THREADING MACHINE.**

Double Application of Power. Double Leader Screws Instantly Changeable, range from 1 to 6 in. Pipe.

Write for Description and Prices

WELLS MACHINE WORKS, FOSTORIA, O.

COMPOUND AND MARINE ENGINES.



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STEEPLE AND
FORE AND AFT
COMPOUNDS.

—Send for Photo and Prices.—

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BOSTWICK PATENT.

A great saving in mortar, material and labor
Write for Catalogue and Sample.
THE BOSTWICK STEEL LATH CO.,
38 Park Row, New York City. Niles, O.
Mention this Paper.

INDUSTRY FILE WORKS,

A. & H. Gough, Props.,
Manufacturers of

Files and Rasps,

Equal to the Best English File.
OLD FILES RE-CUT.
All Kinds of Job Grinding.
OFFICE & WORKS,
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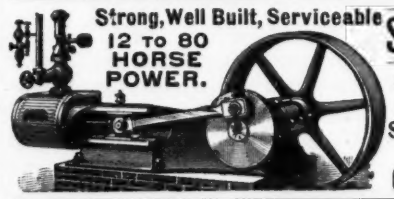
WICHITA, KANSAS.

Strong, Well Built, Serviceable
12 TO 80 HORSE POWER.



STEAM ENGINES

ADAPTED TO HEAVY, CONTINUOUS WORK.
EVERY ENGINE TESTED UNDER FULL LOAD.
Suitable **BOILERS** on hand for immediate delivery
FOR DESCRIPTIVE CIRCULARS ADDRESS
CHANDLER & TAYLOR CO., INDIANAPOLIS, IND.

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For Raising Water from Deep Wells, Streams, Excavations, &c.

The cheapest made. Send for prices.

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Blanks for all the essential points of each policy.

ONLY 50 CENTS (Postage paid).

Will last for years. Sample leaves sent on application. Address

The Cleveland Printing & Publishing Co.
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Save Money. Before you buy a **BICYCLE**

Send for prices to
A. W. GUMP & CO., Dayton, O.
New Bicycles at reduced prices, and 400 second-hand ones, *Difficult Repairing.*
Bicycles, Guns and Type Writers taken in exchange.
Boys' or Girls' 24-in Safety, with rubber tires, $15.00.
Boys' 25-inch Safety, with rubber tires - - 17.50.
Gents' 30-inch Safety, balls to b'g's and pedals, 55.00.

Tens of thousands of these blinds are in use. Agents wanted; Send 4-cent stamp for an 80-page illustrated catalogue to

HARTMAN SLIDING BLIND CO.,
59 Beaver St., WOOSTER O., U. S. A.

The Wock Patent Slip Joint Eaves Trough, 10 ft. 2 in. Long, Without a Seam.

Steel and Wire Hangers, Etc.

THE BELDING PATENT LOCK SLIP JOINT TROUGH, Manufactured by **THE CANTON STEEL ROOFING CO., Canton, O.**

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1. foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 25@16 00; Southern Coke No. 3 Foundry, $15 00@15 75; Southern Coke No 1, Softeners, $15 25@16 00; Southern Coke No. 2, Softeners, $14 50@15 25; Ohio Silveries No. 1, $17 75@18 75; Ohio Silveries No. 2, $16 75@ 17 75; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 25@18 25; Lake Superior Charcoal Nos. 1 to 6, $17 75@18 50; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 00@18 00; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $12 75@13 25; Standard Southern Coke, mottled, $12 50@12 75; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 50@20 50; Tennessee Car Wheel, $18 00@19 00; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $.7 00@00 00; Mahoning and Shenango Valley strong, No 2 Foundry, $16 00@00 00; Ohio Softener No. 1, $17 00@00 00; Ohio Softener No. 2, $ 6 00@00 00; Jackson Co., Silvery No. 1, $18 25@00 00; Jackson Co. Silvery, No. 2, $17 25@00 00; Lake Superior Charcoal, $18 00@00 00; Tennessee Charcoal, $18 00@19 00; Southern Softener No. 1, $16 25@00 00; Southern Softener No. 2, $15 50@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 25@00 00; Alabama Car Wheel, $22 00@22 50; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $19 50@21 00; Southern (other brands), $17 50@18 00; Lake Superior, $20 50@21 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 75@15 00; Southern Coke No. 3, $ 4 00@14 25; Southern Grey Forge, $13 50@13 75; Southern Charcoal No. 1, $17 75@18 00; Southern Charcoal No. 2, $17 25@1: 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@21 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $0 00.

DETROIT (reported by William F. Jarvis & Co): Lake Superior Charcoal, all Numbers, $18 00@18 50; Lake Superior (coke) Bessemer, $17 75@18 50; Katahdin (Maine charcoal), $00 00@00 00; Lake Superior Coke, Foundry, all ore, $17 50@18 00; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 25; Southern No. 1 $16 25@16 50; Southern Gray Forge, $14 00@14 50; Jackson County (Ohio) Silvery, $18 00@18 50; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.co.

LOUISVILLE (reported by Geo. H. Hull & Co): Southern Coke No. 1 Foundry $14 25@14 75; Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75; Grey Forge, $12 75@13 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $19 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 00@16 50; No. 2 Foundry, $15 00@15 50; Grey Forge, $14 00@14 25; White and Mottled, $13 00@13 50; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal, $22 00@27 00; Bessemer, $16 50@16 75.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅛ to 1 inch	1 80
4½ to 6 by ⅛ to 1 inch	1 90
1½ to 6 by 1¼ to 2 inch	2 20
1½ & 1¾ by ⅛ to ¼ inch	1 90
1 & 1¼ by ⅛ to ¼ inch	2 00
⅝, ¾ and ⅞ by ⅛ to ¼ inch	2 20

Round and Square.

1 to 1⅞ inch	1 80
2 to 2⅝ inch	2 00
2¾ to 3¼ inch	2 30
3⅜ to 4 inch	2 80
4⅛ to 4½ inch	3 30
4⅝ to 5 inch	3 50

Oval.

⅜ to 1¼ inch	2 20
½ to ¾ inch	2 40
⅝	2 60
¾	3 00

Half Oval and Half Round.

1¼ to 2 inch	2 90
⅞ to 1¼ inch	2 50
½ to ¾ inch	3 10
⅝	3 30
¾	4 80

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	2 00
¼ to 1¼ by ¼ and 5-16 inch	2 10
¼ to ¾ by ¼ and 5-16 inch	2 30
to 2¾ by ¼ and 5-16 inch	3 80

Hoops.

1¼ to 4, Nos. 13 to 15	2 60
1¼ to 2, Nos. 16 to 18	2 70
1¼ to 2, No. 19	2 80
1¼ to 2, No. 20	2 90
1¼ to 2, No. 21	3 00
1¼ to 2, No. 22	3 10
15-16, I and 1¼, Nos. 13 to 15	2 80
15-16, I and 1¼, Nos. 16 to 18	2 90
15-16, I and 1¼, Nos. 19 and 20	3 00
15-16, I and 1¼, No. 21	3 10
15-16, I and 1¼, No. 22	3 20
⅞, Nos. 13 to 15	3 00
⅞, Nos. 16 to 18	3 10
⅞, Nos. 19 and 20	3 20
⅞, No. 21	3 30
⅞, No. 22	3 40
13-16, Nos. 13 to 15	3 20
13-16, Nos. 16 to 18	3 30
13-16, Nos. 19 and 20	3 40
13-16, No. 21	3 50
13-16, No. 22	3 60
¾, Nos. 13 to 15	3 30
¾, Nos. 16 to 18	3 50
¾, Nos. 19 and 20	3 60
¾, No. 21	3 70
¾, No. 22	3 80
11-16, Nos. 13 to 15	3 50
11-16, Nos. 16 to 18	3 70
11-16, Nos. 19 and 20	3 80
11-16, No. 21	3 90
11-16, No. 22	4 00
⅝, Nos. 13 to 15	3 80
⅝, Nos. 16 to 18	4 00
⅝, Nos. 19 and 20	4 10
⅝, No. 21	4 20
⅝, No. 22	4 30
⅝, No. 23	4 50

Light Band.

1⅜ to 6 by ⅛ to 3-16 in	2 20
1⅜ to 6 by Nos. 11 and 12	2 30
1 to 1⅜ by ⅛ to 3-16 in	2 40
1 to 1⅜ by Nos. 11 and 12	2 50
⅞ and 13-16 by ⅛ to 3-16 in	2 70
⅞ and 13-16 by Nos. 11 and 12	2 80
¾ and 11-16 by ⅛ to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by ⅛ to 3-16 in.	3 30
⅝ and 9-16 by Nos. 11 and 12	3 40
½ by ⅛ to 3-16 in	3 60
½ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12	2 80
⅝ inch, " " " 13 and 14	3 00
¾ inch, " " " 11 and 12	3 10
¾ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 65
No. 15 to 17	2 75
No. 18 to 21	2 99
No. 22 to 24	3 15
No. 25 to 26	3 30
No. 27	3 40
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 60
C No. 1, " "	2 85
C H No. 1 " "	3 10
C H Flange, " "	3 85
Extra Flange, "	4 35
Solid Fire Box "	5 10

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 75
Shell	3 15
Flange	3 45
Marine Flange	3 85
Fire Box	4 55

Above includes plates 90 inches wide.

90 to 96 in. wide	¾c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2⅜ to 3 in	10½
3¼ to 4 in	11
⅝ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 75
Tire	"	2 75
Spring	"	3 25
Sleigh Shoe	"	2 75
Toe Calk	"	3 00
Cutter Shoes, tapered and burr.	"	3 00

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅕, 11-16 and ⅜ inches diameter	4 00
Bridge ⅛, ⅕, 11-16 and ⅜ inch diam.	4 00

SCRAP IRON AND OLD METAL.

	Net Tons
No. 1 R. R. wrought scrap	$18 00
No. 1 wrought scrap	16 50
No. 1 Machine cast scrap	11 50
Iron axles	23 50
Axle turnings	13 50
Cast borings	8 00
Uncut wrought iron boilers	11 50
Steel boiler plates	16 00
Grate Bars	8 00
Pipes and flues (Clean)	12 00
Tank iron	12 50
Hoop and band iron	9 50
Sheet iron	8 50
Wrought drillings	11 00
Malleable iron	9 50

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

CLEVELAND ROLLING MILL CO.,

MANUFACTURERS OF

BESSEMER STEEL RAILS,

Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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MANUFACTURERS OF

SHEET IRON AND SHEET STEEL

Squared Roofing Sheets a Specialty.

CAMBRIDGE REFINED IRON. TRADE MARK

CAPACITY RANGES FROM No 30 26 INCHES WIDE TO 1-4×40×120

CAMBRIDGE SOFT STEEL. TRADE MARK

CORRESPONDENCE SOLICITED

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Ball-Norton (Monarch) Electro Magnetic Separator.

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

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BANK OF COMMERCE BUILDING, PITTSBURGH, PA. ALDRICH COURT, 45 BROADWAY, NEW YORK

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DEALERS IN

Iron Ore & Pig Iron,

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CLEVELAND, O.

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Successors to Tuttle, Oglebay & Co.,

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J. H. OUTHWAITE & CO.,

Exclusive attention given to

LAKE SUPERIOR AND MENOMINEE RANGE

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Perry-Payne B'ld'g. Cleveland, O.

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AND METALS.

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Lake Shipping Point, Lorain O.

JAS. PATTERSON, Sales Agent.

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Cleveland, O., U. S. A.

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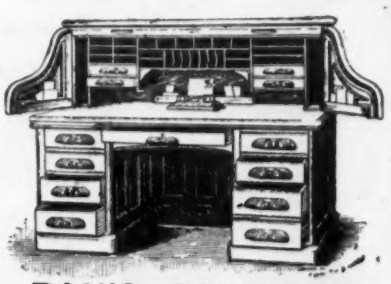

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MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single,.....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4¼c	5¼c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6¾c		5 c
10 lb cans, less than 1c	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5¾	4¾	4	3¾	3¼
Hexagon	15¾	11¾	8¾	6	5¾	5¾	5
Washers	9	8	7	5	4¾	4¾	4¾

In lots less than 100 lbs, ₩ lb add ¼c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17,.....dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¾
Sisal, ½ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine		11½c
3-Ply " 1lb Balls		12@12½c
3-Ply " 1¼ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Mill'er's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

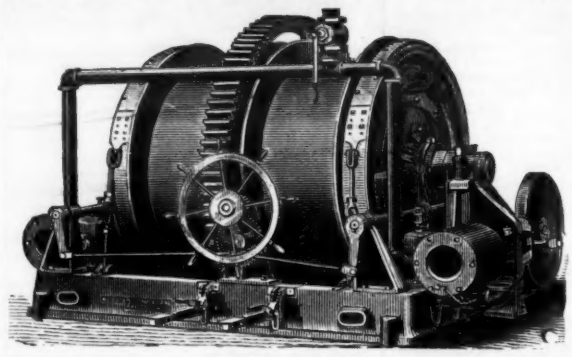
Wire.

	New List, Jan. 18, 1884
Brass and copper	dis 20@25
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis 65&5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 12 to 14	dis 75
Stub's Steel Wire, regular	$6.00@lb dis 3

Wrenches.

Coe's genuine,.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

Webster, Camp & Lane Machine Co.



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Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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OUR **Time Stamps** A M

Mark the hour and minute, the day, month and year, by one impression.

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THE AUTOMATIC TIME STAMP AND REGISTER COMPANY

No. 71 Sudbury St., Boston, Mass., U. S. A.

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CLEVELAND, O.

LIGHT AND HEAVY

IRON CASTINGS.

DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.

DUPLICATE WORK A SPECIALTY

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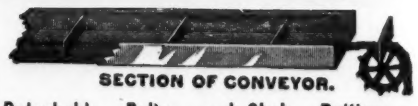

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Detachable Roller and Chain Belting,

MADE IN ALL SIZES OF

Malleable Iron and Steel,

DESIGNED FOR

Elevators, Conveyors, Drive Belts, etc.

For handling materials of all kinds.

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Eastlake Metallic Shingles.

Unequaled for ROOFING AND SIDING.

Manufactured by **W. J. BURTON & CO.'s** Galvanized Iron Cornice Works, Detroit, Mich.

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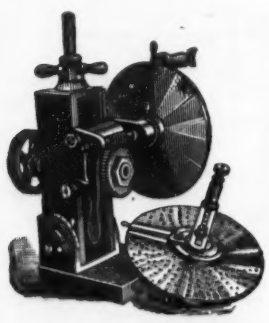

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Or any one having use for SMALL GEARING.

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THE BRIGHTMAN STOKER IS THE BEST
STEAM BOILER FURNACE IN THE WORLD.
SEND FOR DESCRIPTIVE PAMPHLET. THE BRIGHTMAN STOKER CO. 201-203 RIVER ST. CLEVELAND, OHIO.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $7 00
Others.....℔ doz $6 00
Full polished.....℔ doz $8 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

	Per roll of 500 sq. feet.
Eberts Bros., Detroit.	
No. 1—Slaters'.....	$1.25
"A," Stringed Roofing, Light.....	1.50
"B," Stringed Roofing, Medium.....	1.75
"C," Stringed Roofing, Heavy.....	2.00
Stringed, Rosin-Sized.....	1.00

MISCELLANEOUS.

Asphaltum, Trinidad Refined, ℔ ton.....	$30.00
Asphaltum, Fine Grade, ℔ lb.....	.08
Coal Tar Felt, 1 Ply, ℔ lb.....	.02
Coal Tar Felt, 2 Ply, ℔ roll 108 sq ft.....	1.42½
Coal Tar Felt, 3 Ply, ℔ roll 108 sq ft.....	1.85
Roofing Pitch, ℔ gal.....	.09

Chains.

Revised List.
Trace, 6½-10-2.....℔ pair 1.05
Trace, 6½-10-3.....℔ pair .92 } .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ lb 5½@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 50
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt.....	$4 00	$4 50	$.....
Dairy, 14 qt.....	4 50	5 00	.....
Fire 12 qt.....	5 00	.....	.....
Sugar.....	6 00	6 50	.....
Horse.....	.....	5 00	.....
Buggy.....	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.....	6 50	7 50	8 50
Ers, slop, 5 and 5X 14 qt.....	8 00	9 00	10 00
Basins, wash—			
10½ inch.....	2 00	2 25	.....
12 inch.....	2 25	2 75	3 25
13½ inch.....	2 75	3 25	3 75
15 inch.....	3 25	3 75	4 25
Bowls, fruit.....	.....	2 50	.....
Servers, 12 in.....	.....	2 25	.....
Baskets, waste paper, 13 in.....	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch.....	4 00	4 50	5 00
10 and 11½ inch.....	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 55
Scranton.....dis 33⅓
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

	No.	10	9	8	7	6	
Ausable, ℔ M..	23	24	25	26	28		dis 40
Putnam, ℔ M..	18	19	20	21	23		dis 15
Essex							dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hemacite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze.....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
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Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

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Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1888.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ doz $18 dis 25

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Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.
American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes Iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 40&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10
Finishing nails.....dis 60&10
Hungarian nails and miners' tacks...dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
Chair nails.....dis 66&10
Common and patent brads.....dis 66&10

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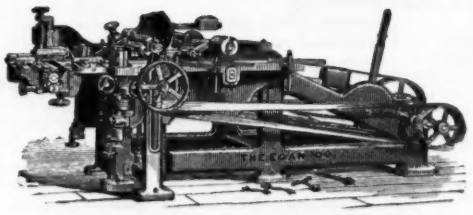

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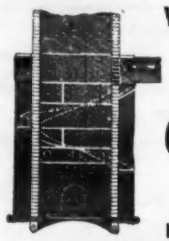

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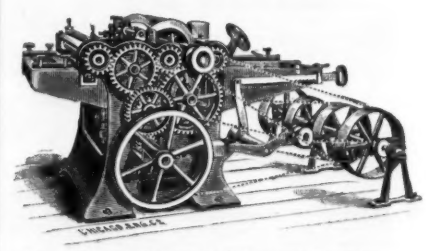

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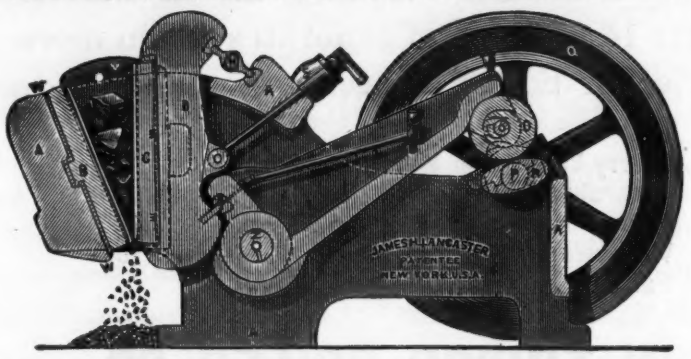

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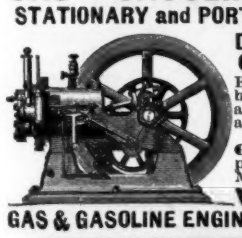

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Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	‡1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m., 6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

Trains marked * run daily.

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FOR AKRON, CANTON AND MARIETTA.

Depot oot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 25 a m	*6 40 p m
Marietta Express.....	†11 15 a m	†2 35 p m
Balto. & Wash. Express....	*4 00 p m	*10 25 a m
Cleve. and Canton Express	†6 30 p m	†8 15 a m

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From Cleveland Union Station.

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Cleveland & Pittsburgh R. R.

	Arrive.	Depart.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	d5 25 a m d11 40 a m 6 35 p m	7 45 a m d1 40 p m d11 10 p m
Wellsville, Wheeling and Bellaire.	12 30 p m 6 35 p m	7 45 a m 1 05 p m *11 10 p m
Alliance Accom.....	10 10 a m	3 25 p m
Ravenna Accom.....	8 25 a m	5 00 p m

d Daily. *Except Saturday. Other trains except Sunday. Through Pullman Sleepers to New York on 1:40 p. m. train daily.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Arrive.	Depart.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	d 7 00 a m 5 40 p m	8 00 a m d 8 00 p m
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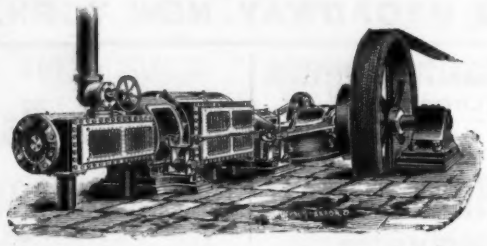

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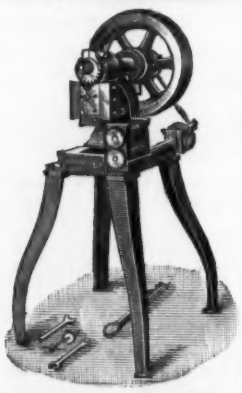

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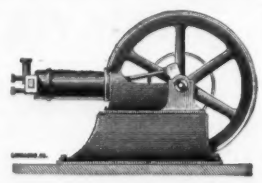

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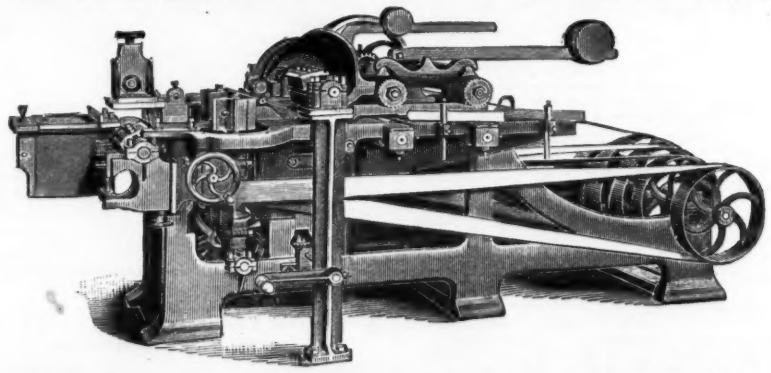

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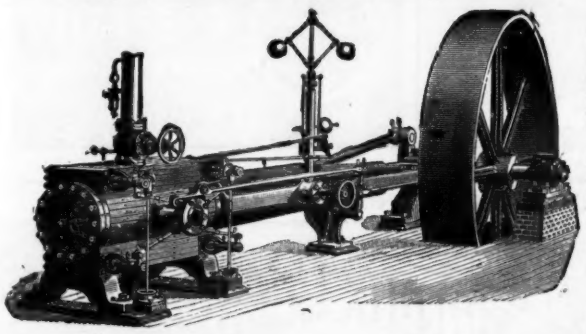

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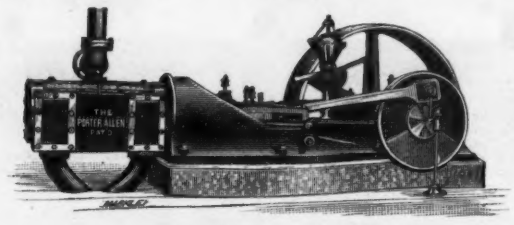

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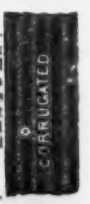

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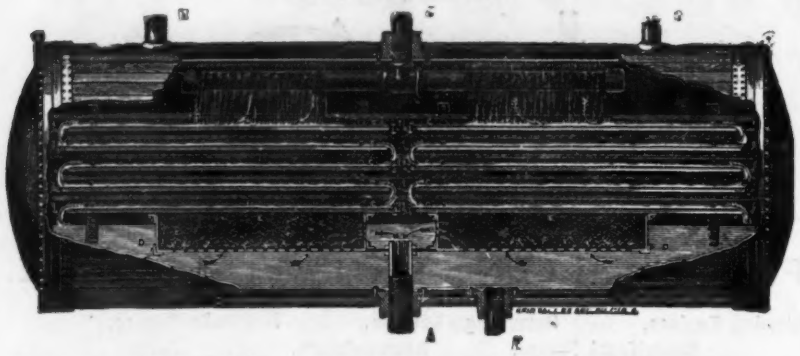

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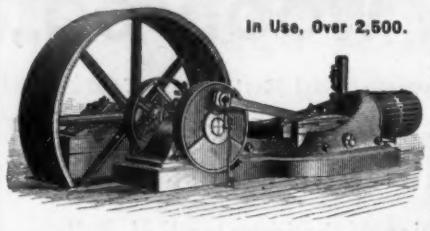

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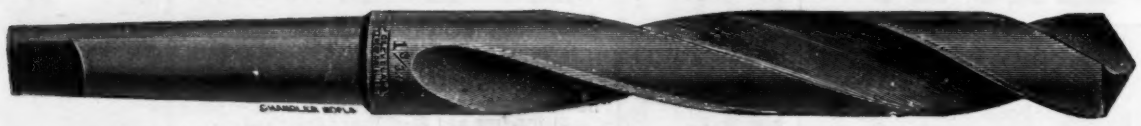

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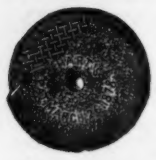

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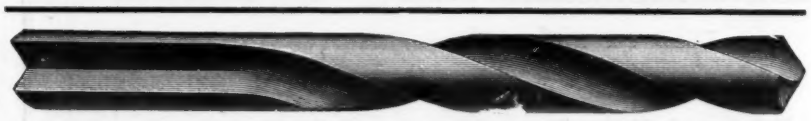

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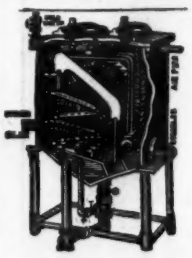

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